

REVIEW OF THE NEARCTIC SPECIES OF THE GENUS
CHELIFERA MACQUART (DIPTERA: EMPIDIDAE; HEMERODROMIINAE)

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Abstract.—The genus *Chelifera* Macquart is reviewed for the Nearctic Region. New descriptions and diagnoses of the genus and 16 previously known species are presented. Six new species are described: *Chelifera bidenta* n. sp., *Chelifera circinata* n. sp., *Chelifera multidenta* n. sp., *Chelifera neangusta* n. sp., *Chelifera subensifera* n. sp. and *Chelifera subnotata* n. sp. *Chelifera scrotifera* Melander is shown to be a junior synonym of *C. valida* (Loew). *Chelifera chvalai* Wagner, known previously only from the Palearctic Region, is reported from North America. Separate keys to male and female adults, illustrations of male terminalia, and known distributions are included.

Key Words: Diptera, Empididae, Hemerodromiinae, *Chelifera*, *Thanatogea*, dance flies

Adult flies of the genus *Chelifera* Macquart (Diptera: Empididae) are similar to those of other genera of Hemerodromiinae in being relatively small and slender, and in possessing strong raptorial forelegs. Their wings lack an anal lobe and are relatively slender. The subfamily Hemerodromiinae has been treated taxonomically by Melander (1902, 1928, 1947) and MacDonald (1988). Species fitting the present concept of *Chelifera* are primarily Holarctic, with 16 described Nearctic species (Melander 1947) and 24 described Palearctic species (Chvala and Wagner 1989), but one species is reported from Chile (Smith 1967) and four are known from New Zealand (Smith 1989).

The genus *Chelifera* is poorly represented in the southeastern United States and the Great Plains of North America, and western species appear to be restricted to higher elevations; only one species, *C. palloris* (Coquillett), occurs widely in the Nearctic Region. Also, only one species, *C. chvalai* Wagner, is known to be Holarctic, but an additional four species, treated below, occur

in Alaska, suggesting that study of the eastern Palearctic fauna may reveal more extensive distributions than presently documented.

Adults of most Nearctic species are not commonly collected, compared to representatives of other genera of Hemerodromiinae, as reflected by their relatively low numbers in North American collections. Indeed, six Nearctic species are represented only by one to three males. Collecting data presented on specimen labels revealed adults of *Chelifera* have been swept from vegetation and taken in Malaise traps set up along streams, but I consistently failed to collect them in habitats where adults of other genera of Hemerodromiinae are commonly encountered. In the present study, no adults were observed on riparian vegetation, and only an occasional adult of three species was collected in Malaise traps set up along or across small streams in hardwood forests of Indiana and Michigan and in the central Sierra Nevada Mountains of California. Adults of the genus *Chelifera* are predacious, but no records of prey capture were

found. The immature stages of several Palearctic species of *Chelifera* are described and known to be aquatic (summarized in Smith 1969); Nearctic species are presumed to be similar in form and habitat (Harper 1980, Landry and Harper 1985, Steyskal and Knutson 1981).

The present taxonomic study is limited to *Chelifera* species of the Nearctic Region and includes a generic diagnosis, diagnoses and descriptions of known species and six newly described species, separate keys to male and female adults, illustrations of male terminalia, and known distributions.

MATERIALS AND METHODS

This study was facilitated by the examination of a relatively large number of specimens added to North American collections since Melander's (1947) revision. The following institutions (acronyms following) provided the material upon which this work is based: American Museum of Natural History, New York (AMNH); California Academy of Sciences, San Francisco (CAS); Canadian National Collection, Biological Resources Division, Agriculture Canada, Ottawa (CNC); British Museum (Natural History), London (BMNH); Cornell University, Ithaca (CU); Florida State Collection of Arthropods, Gainesville (FSCA); James Entomological Collection, Washington State University, Pullman (WSU); Museum of Comparative Zoology, Harvard University, Cambridge (MCZ); Purdue University Entomological Research Collection, W. Lafayette (PERC); Snow Museum, University of Kansas, Lawrence (UKL); National Museum of Natural History, Washington D.C. (USNM); University of California, Riverside (UCR); University of Minnesota, St. Paul (UMSP); University of New Hampshire, Durham (UNH); and Utah State University, Logan (USU). Specimens also came from the author's collection (MAC).

The methods employed in this study were reported in a review of the genus *Chelipoda*

Macquart (MacDonald 1993), which included details of specimen preparation presented by Cumming (1992). Terminology pertaining to vestiture is based on McAlpine (1981), but interpretation of male terminalia follows Cumming and Sinclair (1990); interpretation of female terminalia is based on Cumming and Cooper (1992). The phallus of males was not employed in this study because it is not essential to identification and, unlike certain diagnostic features of terminalia, it usually is not visible on intact specimens and requires dissection from macerated specimens.

Genus *Chelifera* Macquart

Chelifera Macquart, 1823: 150. Type species: *Chelifera raptor* Macquart (1823) (mon.)=*monostigma* (Meigen 1822).

Mantipeza Rondani, 1856: 148. Type species: *Hemerodromia monostigma* Meigen (1822) (orig. des.).

Polydromia Bigot, 1857: 557, 562 (as *Polydromiyya*, which was regarded later as erroneous). Type species: *Tachydromia praecatoria* Fallén, 1816 (des. Coquillett, 1910: 593).

Thanategia Melander, 1928: 263 (as subgenus of *Chelifera*). Type species: *Hemerodromia defecta* Loew, 1862.

Diagnosis.—Adult flies in the genus *Chelifera* are distinguished from those of other Nearctic Hemerodromiinae by the combination of a microscopic antennal stylus together with comparatively greater development of venation. The consistent venational characteristics include: crossveins h and bm-cu present (dm-cu typically is developed, but occasionally is absent or incomplete in one or both wings and nearly always absent in one species); closed cell bm present (cell dm typically is closed also); anal cell developed; and, veins R_{4+5} and M_{1+2} petiolate.

Description.—The Nearctic species of *Chelifera* agree in general with the generic description of Collin (1961), with the fol-

lowing additions and modifications. Body length including terminalia 3.0–5.0 mm. Fore femur ventrally with 2 median rows of 14–20 black setulae, each with flanking row of 4–6 light brown bristles. Wings hyaline; crossveins h and bm-cu present; cell bm closed; anal cell developed; veins R_{4+5} and M_{1+2} petiolate. Male terminalia including hypandrium, pair of epandrial lobes of different shape and vestiture, and pair of cerci of differing shape and vestiture; hypandrium bearing an anterior and a posterior pair of processes of differing length and shape; phallus of differing shape and vestiture, complex apically. Female "ovipositor" of differing degree of development formed from cerci and abdominal segments 8 and 10.

Remarks.—Adults of *Chelifera* closely resemble those of *Metachela* Coquillett, but, as stated above, possess both a microscopic antennal stylus and crossvein bm-cu. In contrast, the latter possess a longer and thicker antennal stylus and lack crossvein bm-cu. These two traits are the basis for treating *Chelifera* and *Metachela* as separate genera, a taxonomic treatment proposed by Coquillett (1903) and followed by Melander (1947). This arrangement is followed in this paper, but no phylogenetic analysis has demonstrated the monophyly of either taxon or their relationship to other genera of Hemerodromiinae. Three species, *Chelifera defecta* (Loew), *C. recurvata* (Melander) and *C. stuprator* (Melander), formerly comprised the genus *Thanategia* Melander, which recently was shown to be a junior synonym of *Chelifera* (MacDonald 1988).

Males of species of *Chelifera* treated here possess terminalia that provide the primary basis for identification, some diagnostic features of which are visible without maceration. The most important characteristics are the general shape, vestiture, and coloration of the cercus and the epandrial lobe, and the structure of the anterior and posterior pairs of hypandrial processes; the latter are visible only on macerated specimens. In ad-

dition, structure and vestiture of legs, and coloration patterns are of taxonomic value and are employed in the identification key.

Females of species of *Chelifera* treated here lack several leg characters found on conspecific males, but most species can be identified by using a combination of the presence or absence of an ovipositor, body coloration, presence or absence of a wing stigma, minor differences in venation, and body size. The ovipositor is important in separating groups of species. Three descriptive phrases are applied to the ovipositor in the key and treatments of species: well-developed, moderately developed, or weakly developed. A well-developed ovipositor (Fig. 27) is at least three times longer than its basal width, strongly sclerotized, and shiny; each cercus is at least twice its basal width. A moderately developed ovipositor, characteristic of a few species, is about two times longer than its basal width, sclerotized, and shiny; each cercus is longer than its basal width. A weakly developed ovipositor (Fig. 28) lacks elongation and sclerotization, and each cercus is shorter than its basal width. Females of sympatric species may be difficult to distinguish and their identification depends on association with concurrently collected males or by geographical distribution.

Half of the Nearctic species appear to belong to three informal species groups, the *C. notata* (Loew) group, the *C. cirrata* Melander group, and the *C. varix* Melander group. Described below, these groupings facilitate the diagnosis of species treated below. No phylogenetic analysis has demonstrated the monophyly of these groups, however, and the relationships of the remaining eleven species have not been resolved. Examination of various components of male terminalia of these eleven species suggested additional informal species groups, but such groups were not consistently supported by non-genital characters.

The *C. notata* group includes *C. notata*,

C. caliga Lavallee, and three new species described below, *C. neangusta*, *C. subensifera* and *C. subnotata*. This group is characterized by the development of a row of black setulae midway along the ventral surface of the mid femur on males, a large black setula situated basomedially on each cercus of males, a well-developed ovipositor in females, and a prominent stigma immediately anterior to the union of R_{2+3} with C in both sexes. The *C. cirrata* group includes *C. cirrata*, *C. ensifera* Melander, and one new species described below, *C. subensifera*. This group is characterized by the unusual development of the eighth abdominal tergum in males, which extends posteriorly to cover much of the hypandrium and part of the epandrial lobes. Females possess a well-developed ovipositor, and both sexes possess two rows of black setulae on the ventral surface of the fore tibia (see Fig. 26). This latter trait contrasts to the presence of but one row in other species treated here. The *C. varix* group includes *C. varix*, *C. chvalai* Wagner, and *C. mana* Lavallee. This group is characterized by an unusual development of the fore femur in males, the diameter of which is at least three times that of the fore tibia and which has a distal projection that bears a thick fringe of golden setae along its inner surface (see Fig. 7). Females possess a well-developed ovipositor, but unlike females of the *C. notata* group they lack a wing stigma and unlike those of the *C. cirrata* group they possess but a single row of setulae on the ventral surface of the fore tibia.

- stripes (usually complete, especially on posterior third); cercus lacking mid-dorsal, hooked process 3
- 3. Scutum with 1 broad, darker median stripe 4
- Scutum with 2 thin, darker lateral stripes (usually complete, especially on posterior third) 5
- 4. Cercus dark brown, contrasting with yellowish brown epandrial lobe; cercus slender distally, with dorsal undulation on basal third; (Fig. 3) *C. notata* (Loew)
- Cercus and epandrial lobe brown; cercus broadened distally, lacking dorsal undulation on basal third (Fig. 4) *C. subnotata*, n. sp.
- 5. Scutum with 2 complete lateral stripes; cercus and epandrial lobe yellowish brown; cercus abruptly narrowed ca. midway in lateral view (Fig. 5) *C. caliga* Lavallee
- Scutum with 2 lateral stripes on posterior third only; cercus brown, contrasting with yellowish brown epandrial lobe; cercus smoothly undulant in lateral view (Fig. 6) *C. neangusta* n. sp.
- 6. Fore femur diameter at least 3 × that of fore tibia; inner surface of fore femur with distal projection bearing thick fringe of golden setae (Fig. 7) 7
- Fore femur diameter ca. 2 × that of fore tibia; inner surface of fore femur lacking both distal projection and fringe of golden setae 9
- 7. M_1 ca. 3 × longer than stem M_{1+2} (Fig. 29); mid tibia ventrally with pre-apical cavity lined by black setulae (Fig. 8); terminalia (Fig. 9) concolorous brown *C. chvalai* Wagner
- M_1 subequal to stem M_{1+2} (see Fig. 30); mid tibia lacking pre-apical cavity (however, row of black setulae present along ventral surface); terminalia concolorous yellow 8
- 8. Fore tibia with black spot midway on inner surface; mesal margin of cercus concave in dorsal view, black setulae not apparent in lateral view (unless macerated) (Fig. 10) *C. varix* Melander
- Fore tibia lacking spot midway on inner surface; mesal margin of cercus nearly straight in dorsal view, black setulae visible on un-macerated specimens (Fig. 11) *C. mana* Lavallee
- 9. Abdominal tergum 8 greatly expanded posterolaterally and broadly overlapping epandrial lobes (Figs. 12–14) 10
- Abdominal tergum 8 not expanded posterolaterally, not overlapping epandrial lobes 12
- 10. Terminalia concolorous yellowish brown, contrasting with dark brown abdomen; apex of cercus ending in triangular process (Fig. 12) *C. cirrata* Melander
- Terminalia not concolorous, cercus and ab-

KEY TO MALE ADULTS OF THE NEARCTIC SPECIES OF *CHELIFERA* MACQUART

- 1. Mid femur ventrally with black setulae midway (Fig. 1); stigma usually developed (Fig. 30) 2
- Mid femur ventrally lacking black setulae midway; stigma lacking (Fig. 29) 6
- 2. Scutum nearly concolorous light brown; cercus with mid-dorsal, hooked process directed inward and bearing 3 distal setulae (Fig. 2) *C. circinata*, n. sp.
- Scutum with either 1 median or 2 longitudinal

- domen dark brown, contrasting with light brown epandrial lobes and hypandrium; apex of cercus oval or spatula-shaped (Figs. 13, 14) 11
- 11. Distal tarsomere dark brown, contrasting with remaining light brown tarsomeres; apex of cercus spatula-shaped, lacking transverse ridge on inner surface (Fig. 13) *C. subensifera*, n. sp.
 - Tarsomeres concolorous light brown; apex of cercus broadly oval, with transverse ridge on inner surface (Fig. 14) *C. ensifera* Melander
- 12. Thorax, abdomen, and terminalia concolorous brownish black or reddish black 13
 - Thorax, abdomen, and terminalia not concolorous brownish black or reddish black; thorax either concolorous yellow or light brown, or with dark pigmentation on light brown background 15
- 13. Body length 3.0-3.2 mm; cercus slender basally and distally with mid-dorsal process projecting inward and bearing 5-6 black setulae (Fig. 15) *C. stuprator* (Melander)
 - Body length 4.2-4.8 mm; cercus distinctly modified, either very large with clubbed process (Fig. 16) or apex greatly elongated and curved upward and inward (Fig. 17) 14
- 14. Cercus (Fig. 16) with straight, clubbed process arising from deep, dorsal cavity; scutum with 2 dark, longitudinal stripes; flagellum dark brown, scape and pedicel yellow *C. valda* (Loew)
 - Cercus (Fig. 17) long and slender, apex curving upward and inward, lacking clubbed process; scutum with 2 faint, longitudinal stripes; antenna concolorous yellow *C. recurvata* (Melander)
- 15. Mesothorax with dark brown markings against a light brown background 16
 - Mesothorax nearly concolorous yellow or light brown 17
 - (some specimens of *C. palloris* run to couplet 17, but their cercus is distinctive; see Fig. 19)
- 16. Mesothorax with dark stripe above notopleural suture; cercus (Fig. 18) brown, extending beyond epandrial lobe, bearing mid-dorsal row of black setulae *C. obsoleta* (Loew)
 - Mesothorax lacking dark stripe above notopleural suture; cercus (Fig. 19) light brown, subequal in length to epandrial lobe, lacking mid-dorsal row of black setulae *C. palloris* (Coquillett)
- 17. Cercus deeply excavated distally; much broader distally than basally (Figs. 20-21) 18
 - Cercus not excavated distally; uniformly slender, not broader distally than basally (Figs. 22-25) 19
- 18. Cercus dark brown to black over distal third, contrasting strongly with yellow basal portion;

- terminalia as in Fig. 20 *C. defecta* (Loew)
- Cercus concolorous yellow; terminalia as in Fig. 21 *C. banksi* Melander
- 19. Cercus undulant dorsally in lateral view, bearing row of 10-12 black setulae from basal third to midway along mediiodorsal margin (Fig. 22) *C. rastrifera* Melander
 - Cercus not undulant dorsally in lateral view; row of 2-6 black setulae limited to thumb-like process or straight surface perpendicular to dorsal margin about midway along mediiodorsal margin 20
- 20. Terminalia with at least apex of cercus dark brown, contrasting with lighter brown epandrial lobe and hypandrium; cercus (Fig. 23) with thumb-like, mid-dorsal process bearing 5-6 black setulae *C. lovetti* Melander
 - Terminalia concolorous yellow or yellowish brown; cercus lacking thumb-like, mid-dorsal process; black setulae on cercus arising from straight surface perpendicular to dorsal margin 21
- 21. Vertex, gena, occiput, and postgena orange; cercus (Fig. 24) with 5 black setulae arising from straight surface perpendicular to dorsal margin *C. multidentata*, n. sp.
 - Vertex, gena, occiput, and postgena black; cercus (Fig. 25) with 2 black setulae arising from straight surface perpendicular to dorsal margin *C. bidentata*, n. sp.

KEY TO FEMALE ADULTS OF THE NEARCTIC SPECIES OF *CHELIFERA* MACQUART

- 1. Ovipositor well-developed, ca. 3× longer than basal width, strongly sclerotized, shiny (Fig. 27) 2
 - Ovipositor weakly developed, unsclerotized, and matte (Fig. 28), or moderately developed (similar to Fig. 27, but ca. 2.0× longer than basal width, sclerotized, but nearly matte) 10
- 2. Wing stigma usually prominent, light brown to dark brown (Fig. 30) 3
 - Wing stigma lacking (Fig. 29) 5
- 3. Scutum nearly concolorous light brown *C. circinata*, n. sp.
 - Scutum with 1 or 2 longitudinal stripes, usually more darkly pigmented than background 4
- 4. Scutum with 2 thin longitudinal stripes *C. caliga* Lavalley
 - Scutum with 1 broad median stripe *C. notata* (Loew), *C. subnotata*, n. sp.
- 5. Fore tibia with 2 complete rows of black setulae ventrally (Fig. 26) 6
 - Fore tibia at most with 1 row of black setulae ventrally 8

- 6. M_1 ca. $2 \times$ longer than stem M_1 (see Fig. 29); thorax with contrasting darker pigmentation patterns against a golden brown background *C. cirrata* Melander
- M_1 ca. $1.5 \times$ longer than stem M_{1+2} ; thorax concolorous, light brown to reddish black 7
- 7. Distal tarsomere brown, contrasting with paler basal tarsomeres *C. subensifera*, n. sp.
- Distal 2 tarsomeres light brown, grading into paler basal tarsomeres *C. ensifera* Melander
- 8. M_1 at least $3 \times$ longer than stem M_{1+2} (Fig. 29); thorax grayish brown *C. chvalai* Wagner
- M_1 ca. $1.5 \times$ longer than stem M_{1+2} ; thorax yellow 9
- 9. Abdominal terga pigmented mid-dorsally *C. mana* Lavallee
- Abdominal terga yellow, lacking mid-dorsal pigmentation *C. varix* Melander
- 10. Thorax concolorous reddish black 11
- Thorax concolorous yellow or with contrasting dark pigmentation on light brown background 13
- 11. Body length 3.8–4.0 mm; dm-cu usually absent in both wings; R_4 often completely or partially absent in one or both wings *C. stuprator* (Melander)
- Body length 4.2–5.0 mm; dm-cu and R_4 variable (see couplet 12) 12
- 12. Scutum with 2 distinct, longitudinal stripes; flagellum brown, scape and pedicel yellow; dm-cu and R_4 typically complete *C. valida* (Loew)
- Scutum with 2 faint longitudinal stripes; flagellum yellow; dm-cu and R_4 usually completely or partially absent in one or both wings *C. recurvata* (Melander)
- 13. Mesothorax with contrasting dark pigmentation on lighter brown background 14
- Mesothorax nearly concolorous yellow or concolorous yellowish brown 15
- 14. Mesothorax with dark stripe above notopleural suture *C. obsoleta* (Loew)
- Mesothorax lacking dark stripe above notopleural suture *C. palloris* (Coquillett)
(see couplets 16 and 18)
- 15. Distributed in Rocky Mountains and Pacific coast areas 16
- Distributed in Appalachian mountains and eastern seaboard areas 17
- 16. Vertex, gena, occiput, and postgena black *C. bidentata*, n. sp.
(some specimens of *C. palloris* key here)
- Gena and postgena usually orange (occasionally nearly black) *C. loveti* Melander
- 17. Vertex, occiput, postgena, and gena yellow to orange *C. multidentata*, n. sp.
- Vertex, occiput, postgena, and gena black 18

- 18. Abdominal terga with black pigmentation mid-dorsally *C. rasifera* Melander
(some specimens of *C. palloris* key here, but they are larger and golden brown in color)
- Abdominal terga yellow, lacking mid-dorsal pigmentation *C. defecta* (Loew), *C. banksi* Melander

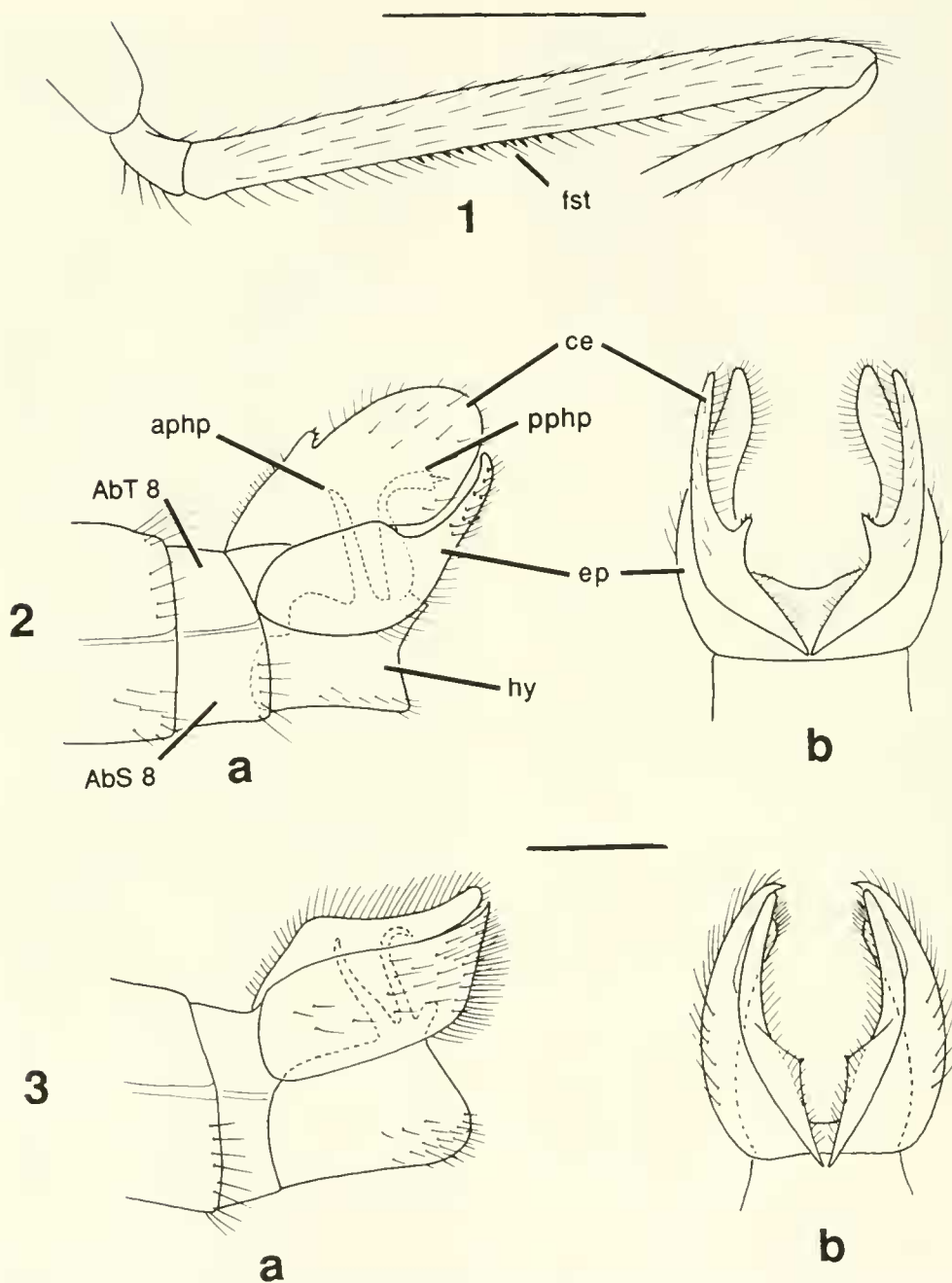
Chelifera banksi Melander
Figs. 21, 35

Chelifera banksi Melander, 1947: 253.

Diagnosis.—Males possess a distinctive cercus that is deeply excavated distally and larger than the corresponding epandrial lobe. Females are concolorous yellow to light reddish brown, lack pigmented abdominal terga, and are relatively large compared to females of sympatric species that have a weakly developed ovipositor. Females of *C. banksi* come out in the key with those of *C. defecta*, but all known specimens of the former possess complete venation. In contrast, the absence or partial expression of dm-cu in one or both wings is characteristic of nearly all females of *C. defecta*.

Description.—Male: length including terminalia 4.0–4.2 mm. Generally body color yellow to light orange-brown. *Head*: black; antenna yellow. *Thorax*: yellow to light orange-brown, densely pruinose. Legs yellow, except distal 1–2 tarsomeres light brown on mid and hind leg; mid leg lacking prominent vestiture. Wing stigma lacking. *Abdomen*: yellow to light orange-brown. Terminalia (Fig. 21): yellow to light orange-brown; cercus large, deeply excavated distally, projecting beyond epandrial lobe and hypandrium; anterior hypandrial process long, slightly bent posteriorly midway and sharply bent posteriorly at apex; posterior hypandrial process much shorter, bluntly pointed at apex. Female: similar to male except length including terminalia 4.8–5.0 mm and thorax less pruinose; ovipositor weakly developed (see Fig. 28).

Type material examined.—Holotype male, labeled "Watertown CT/5 June 1931/



Figs. 1-3. 1, *Chelifera caliga* male mid femur. fst = mid femur setulae. 2a (lateral) and b (dorsal), *Chelifera circumnata* male terminalia. 3a (lateral) and b (dorsal), *Chelifera notata* male terminalia. AbS 8 = abdominal sternum eight; AbT 8 = abdominal tergum eight; ahp = anterior hypandrial process; ce = cercus; ep = epandrial lobe; hy = hypandrium; php = posterior hypandrial process. Hypandrium omitted in dorsal view. Phallus omitted. Scale bars = 0.5 mm (Fig. 1); 0.25 mm (Figs. 2, 3).

AL Melander" (USNM). The specimen is in excellent condition and most of the diagnostic features of terminalia visible without maceration. The type locality is in Litchfield County about 6 kilometers northwest of Waterbury, Connecticut. Paratype: North Carolina: 1 male, Black Mt., N. Frk. Swannanoa R., May (USNM).

Other specimens examined.—CANADA. Nova Scotia: 2 males, Cape Breton Nat. Pk., Jun–Jul; Quebec: 3 females, 1 male, Covey Hill, Jun; 1 female, Knowlton, Jul (CNC). UNITED STATES. Georgia: 1 male, Dawson Co., Amicalola Falls St. Prk., Apr (CNC). Tennessee: 1 female, Gatlingburg, Jul (USNM).

Distribution.—This species is known only from eastern Canada, Connecticut, and the southern Appalachian Mountains (Fig. 35).

Chelifera bidenta MacDonald,

NEW SPECIES

Figs. 25, 34

Diagnosis.—Males possess a slender cercus with two black setulae situated along a straight surface that is perpendicular to the dorsal margin. This character distinguishes them from males of other species of small, yellow *Chelifera* in the western United States that lack distinctive leg structures or vestiture. The lone female of *C. bidenta* possesses a moderately developed ovipositor and thus is distinguished from females of *C. mana* and *C. varix*, both of which have a well-developed ovipositor. Females of *C. bidenta* may be difficult to distinguish from females of *C. lovetti* in which the characteristic orange coloration of the head is lacking, but the latter possess a weakly developed ovipositor.

Description.—Male: Length including terminalia ca. 3.0 mm. General body color yellow. *Head*: black; mouthparts yellow, palps nearly white; antenna pale yellow. *Thorax*: yellow with light orange tinge, sparsely pruinose. *Legs*: pale yellow, distal

2 tarsomeres light brown, less pronounced on fore tarsus; mid leg lacking prominent vestiture. *Wing*: hyaline, stigma lacking. *Abdomen* yellow. *Terminalia* (Fig. 25): yellow; cercus narrowed distally, with 2 black setulae on perpendicular surface ca. midway along mediodorsal margin; anterior hypandrial process long and slender, smoothly curved posteriorly at apex; posterior hypandrial process not apparent.

Female: similar to male except length including terminalia ca. 3.5 mm; ovipositor moderately developed (resembling Fig. 27, but shorter, less sclerotized, and nearly matte).

Type material.—Holotype male, labeled "Pinecrest, CALIF./Tuolumne County/Aug. 13 (handwritten), 1948/P. H. Arnaud, Jr." (CAS). The specimen is in good condition and most of the diagnostic features of terminalia visible without maceration. The type locality is about 40 kilometers northeast of Sonora, California. Allotype, labeled "U.S.A.: CALIFORNIA:/Fresno County, Bolsillo/lo Creek at Bolsillo/Campground, SW of/Mono Hot Springs/8-VIII-1975 2,270 m/Paul Arnaud, Jr./Calif. Acad. Sci. Coll." (CAS). Paratypes. California: 1 male (macerated terminalia in glycerin microvial attached to pin partially damaged and overcleared), 2 females, same collecting data as allotype (CAS).

Distribution.—This species is known only from a few specimens collected in the central Sierra Nevada Mountains of California (Fig. 34).

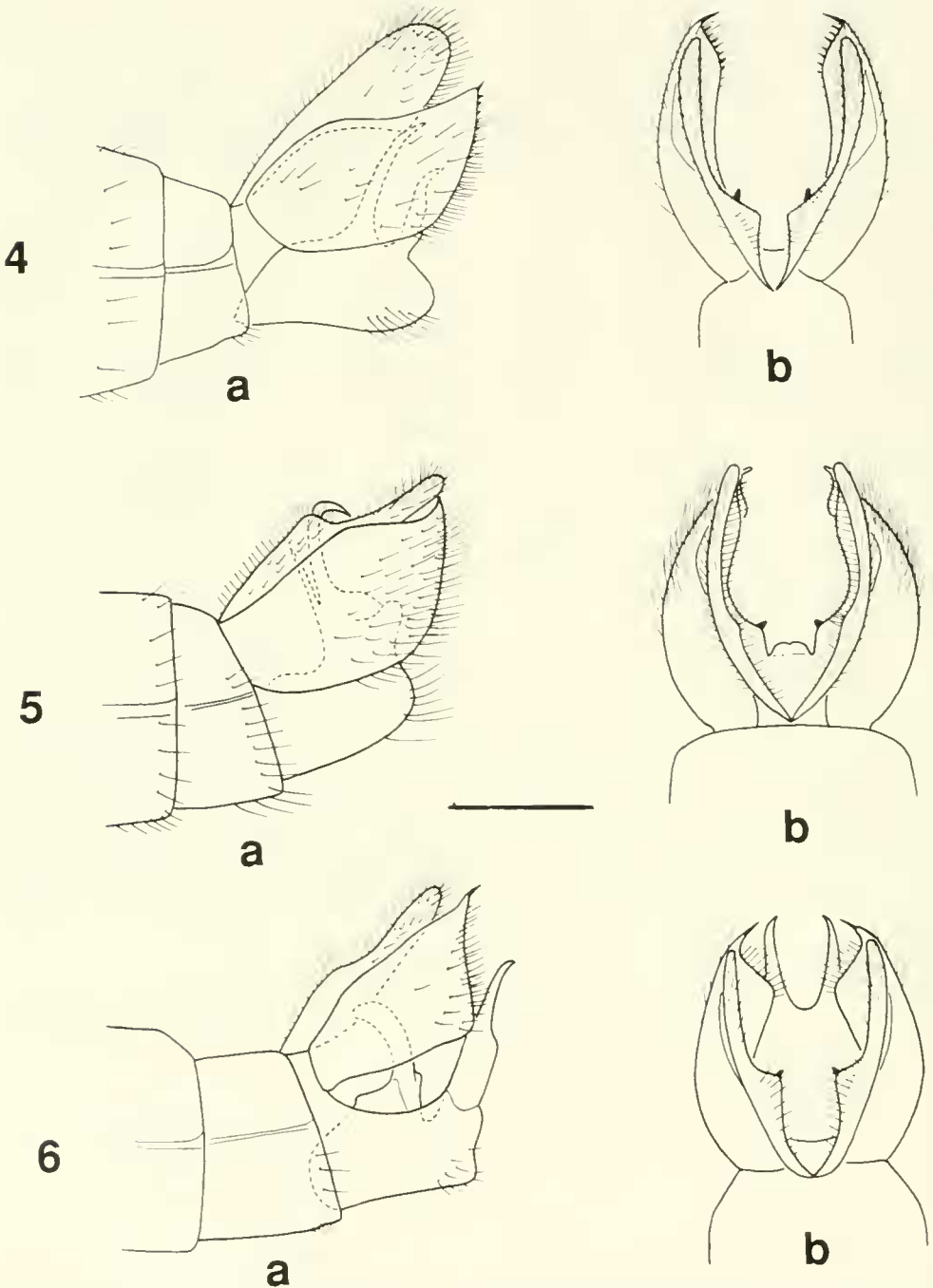
Etymology.—The specific epithet is formed from the Latin "bi," for double, and "denta," for tooth, in reference to the distinctive pair of black setulae on each cercus.

Chelifera caliga Lavalley

Figs. 1, 5, 30, 31

Chelifera caliga Lavalley, 1975: 98.

Diagnosis.—This species is a member of the *C. notata* group. Adults typically possess



Figs. 4-6. 4a (lateral) and b (dorsal), *Chelifera subnotata* male terminalia. 5a (lateral) and b (dorsal), *Chelifera caliga* male terminalia. 6a (lateral) and b (dorsal), *Chelifera neangusta* male terminalia. Hypandrium omitted in dorsal view. Phallus omitted. Scale bar = 0.25 mm.

a pair of fully developed dorsolateral stripes on the scutum, which distinguishes them from related species. However, in some specimens of *C. caliga* the stripes are faint and represented solely by a denuded line. These individuals resemble adults of *C. circumcinata*, but the latter have a rounder and much darker stigma. The phallus is clearly visible on males of *C. caliga*, projecting dorsally well above the cercus. This feature characterizes unmacerated males of *C. caliga* from those of other species of the *C. notata* group.

Description.—Male: length including terminalia 3.8–4.0 mm. General body color yellowish brown to light reddish brown. *Head*: black; antenna pale yellow to light reddish brown, stylus usually darker. *Thorax*: yellowish brown to light reddish brown, pruinose; 2 longitudinal stripes on scutum, diverging laterally on scutal depression, faintly pigmented to dark brown; postnotum usually brown. Legs yellow, except distal 2 tarsomeres brown; mid femur (Fig. 1) with ventral row of black setulae along middle third; mid tibia with distal row of black setae. Wing stigma (Fig. 30) developed, usually light brown. *Abdomen*: brown to light reddish brown. Terminalia (Fig. 5) yellowish brown; cercus abruptly narrowed ca. midway in lateral view, strong black setula basomedially; epandrial lobe ending in strong bristle; anterior hypandrial process thin, slightly turned anteriorly at apex; posterior hypandrial process longer and thicker, sharply curved posteriorly at the apex. Female: similar to male except length including terminalia 3.8–4.2 mm, scutal stripes usually darker brown, distal 2 tarsomeres lighter brown, wing stigma usually darker brown, and lacking prominent vestiture on mid leg; ovipositor well-developed (see Fig. 27).

Type material examined.—Holotype male, labeled "Brainard Lk. Rec Area/4 mi. west of Ward, Colo/20 Aug 1973, cir 13,500'/elev. A. G. Lavalley" (USNM, type

no. 73192). The specimen is in excellent condition, with macerated terminalia in a glycerin microvial attached to pin. The type locality is in Boulder County, about 20 kilometers west of Boulder, Colorado. The holotype differs from most other males by the weakly developed wing stigma and few setulae on the mid femur; however, both legs are distorted and the setulae may have been dislodged.

Other specimens examined.—California: 1 male, Modoc Co., Aug (CAS). Idaho: 3 females, Franklin Co., Cub R. Cyn., Aug–Sep (USU). Utah: Cache Co.; 1 female, Franklin Basin, Jul; 49 females, 4 males, Logan Cyn., Aug–Sep; 1 male, 2 females, W. Hodges Cyn., Sep (USU). Washington: 10 females, 8 males, Mt. Ranier Nat. Prk., Tahoma R., Aug; 1 male, Mt. Ranier Nat. Prk., White R. cmpgr., Aug (WSU).

Distribution.—This species appears to be restricted to higher elevations of the western United States, from central Colorado west to northern California and north into Washington (Fig. 31).

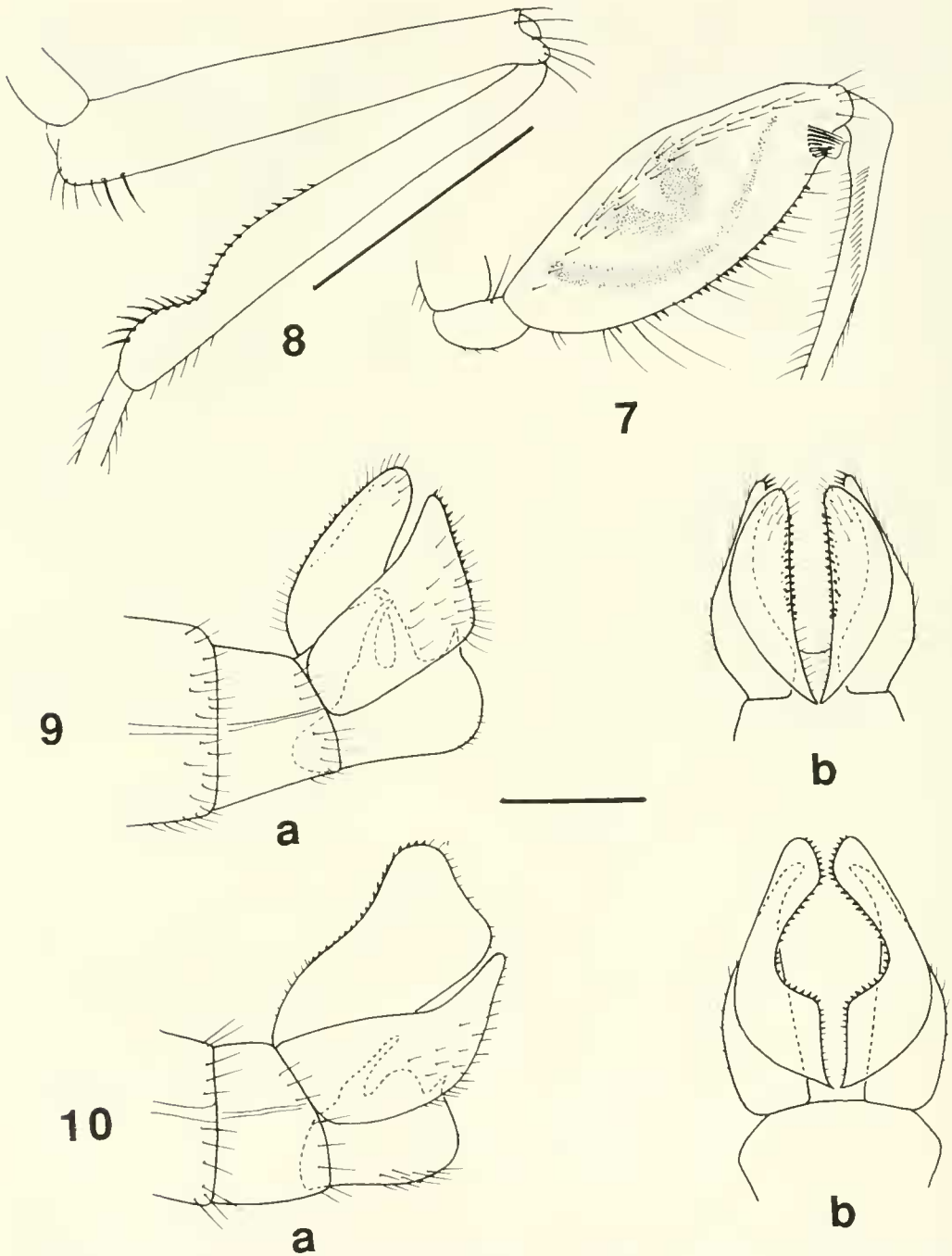
Chelifera chvalai Wagner

Figs. 8, 9, 29, 32

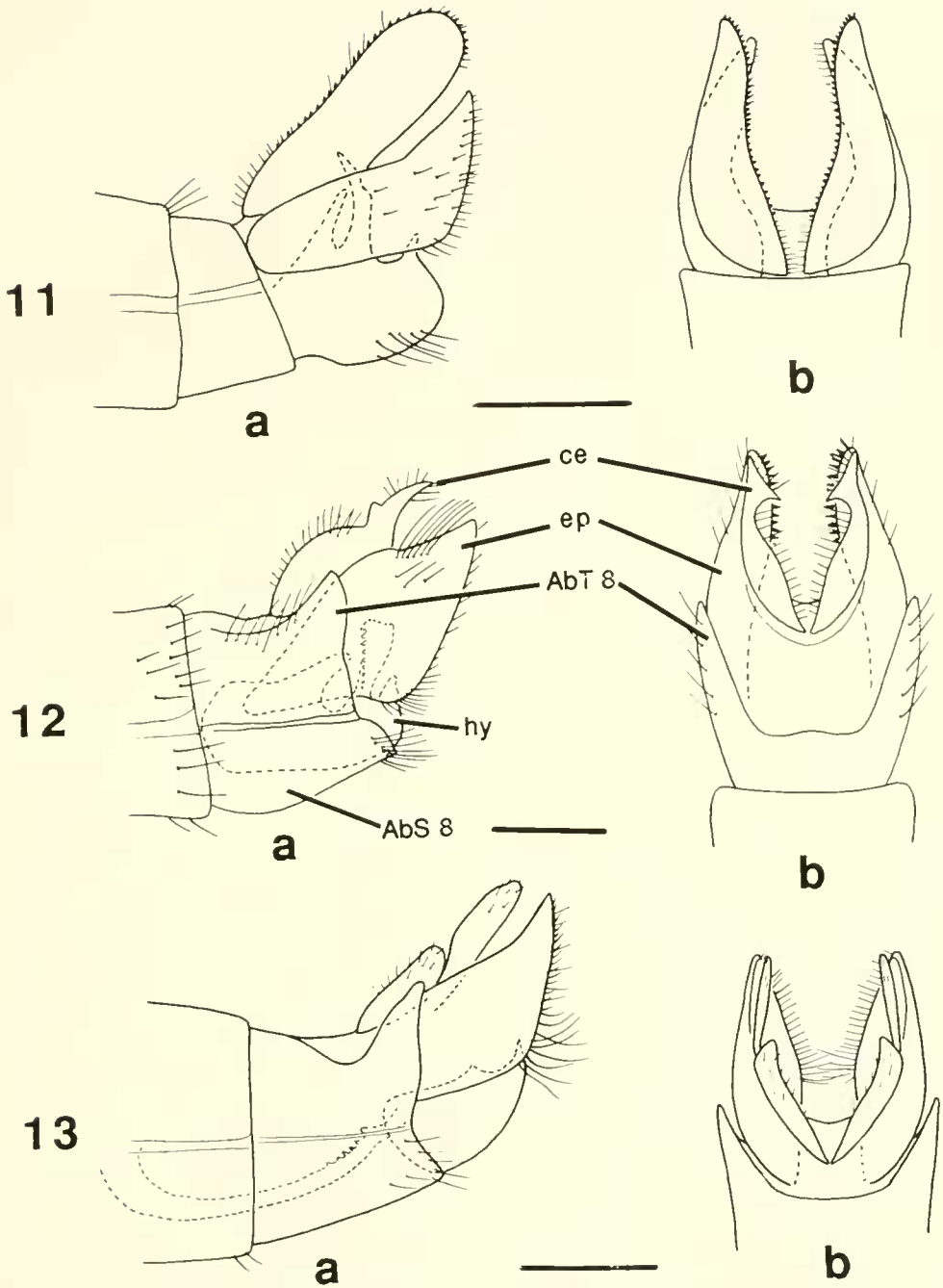
Chelifera chvalai Wagner, 1984: 459.

Diagnosis.—This species is a member of the *C. varix* group. Males possess a distinctive mid tibia, bearing a distal cavity lined with black setae. Females have a contrastingly dark antennal flagellum, and vein M_1 is 3–4 times longer than stem M_{1+2} , distinguishing them from females of *C. mana* and *C. varix*, in which the antenna is concolorous and M_1 and stem M_{1+2} are subequal in length.

Description.—Male: length including terminalia 3.8–4.0 mm. General body color golden brown with darker pleura, abdomen, and terminalia. *Head*: dark reddish brown; mouthparts yellow, palps yellowish white; antennal flagellum and stylus brown, contrasting with lighter brown scape and ped-



Figs. 7-10. 7. *Chelifera varix* male fore femur. 8. *Chelifera chvalai* male mid tibia. 9a (lateral) and b (dorsal), *Chelifera chvalai* male terminalia. 10a (lateral) and b (dorsal), *Chelifera varix* male terminalia. Hypandrium omitted in dorsal view. Phallus omitted. Scale bars = 0.5 (Figs. 7, 8); 0.25 (Figs. 9, 10).



Figs. 11-13. 11a (lateral) and b (dorsal), *Chelifera mana* male terminalia. 12a (lateral) and b (dorsal), *Chelifera cirrata* male terminalia. 13a (lateral) and b (dorsal), *Chelifera subensifera* male terminalia. AbS 8 = abdominal sternum eight; AbT 8 = abdominal tergum eight; ce = cercus; ep = epandrial lobe; hy = hypandrium. Hypandrium omitted in dorsal view. Phallus omitted. Scale bar = 0.25 mm.

icel. *Thorax*: scutum golden brown, with reddish brown area along notopleural suture and also above humeral region; scutellum reddish brown; pleura reddish brown, except yellow just above all coxae. Legs yellow, except distal 3 tarsomeres light brown or brown; inner surface of fore femur usually with several small, pigmented patches; fore femur enlarged, diam. ca. $3\times$ that of fore tibia, with distal process on median surface bearing dense fringe of golden setae; mid tibia (Fig. 8) ventrally with distal cavity lined by black setae; mid femur basally bearing 3 yellow bristles on projection that fits into corresponding distal cavity on mid tibia. Wing stigma lacking: M_1 at least $3\times$ longer than stem M_{1+2} (Fig. 29). *Abdomen*: terga brown to dark brown, sterna light brown. Terminalia (Fig. 9): nearly concolorous brown (hypandrium lighter brown); cercus broadly and smoothly elongate, with black setulae along mediodorsal margin; anterior hypandrial process slender, curved posteriorly; posterior hypandrial process also slender, but longer and slightly curved anteriorly. Female: similar to male except: length including terminalia 4.2–4.5 mm; antenna, mouthparts, and palps somewhat darker; legs lacking prominent features and vestiture; distal 3 tarsomeres lighter brown; and, M_1 ca. 3–4 times longer than stem M_{1+2} (Fig. 29); ovipositor well-developed (see Fig. 27).

Type material.—Holotype male (not examined) collected in Central Asia, Uzbekistan, May 5, 1980; deposited in der Limnologischen Flaussstation des Max-Planck-Instituts für Limnologie, Schlitz, Germany.

Specimens examined.—Manitoba: 4 males, 5 females, nr. Churchill, Jun–Jul (CNC). Newfoundland: 1 male, 2 females Hebron, Jul (CNC). Quebec: 3 males, 3 females, Indian House L., Jul (CNC). Northwest Territories: 5 females, Hodgeson Lk., Norman Wells, Jul (CNC). Saskatchewan: 2 males, Uranium City, Jun (CNC). Yukon

Territory: 10 males, 14 km NW Steward Crossing, Jun–Jul (CNC).

Distribution.—This species was described from central Asia (Wagner 1984); in the Nearctic Region, specimens have been collected across northern Canada (Fig. 32).

Chelifera circinata MacDonald,

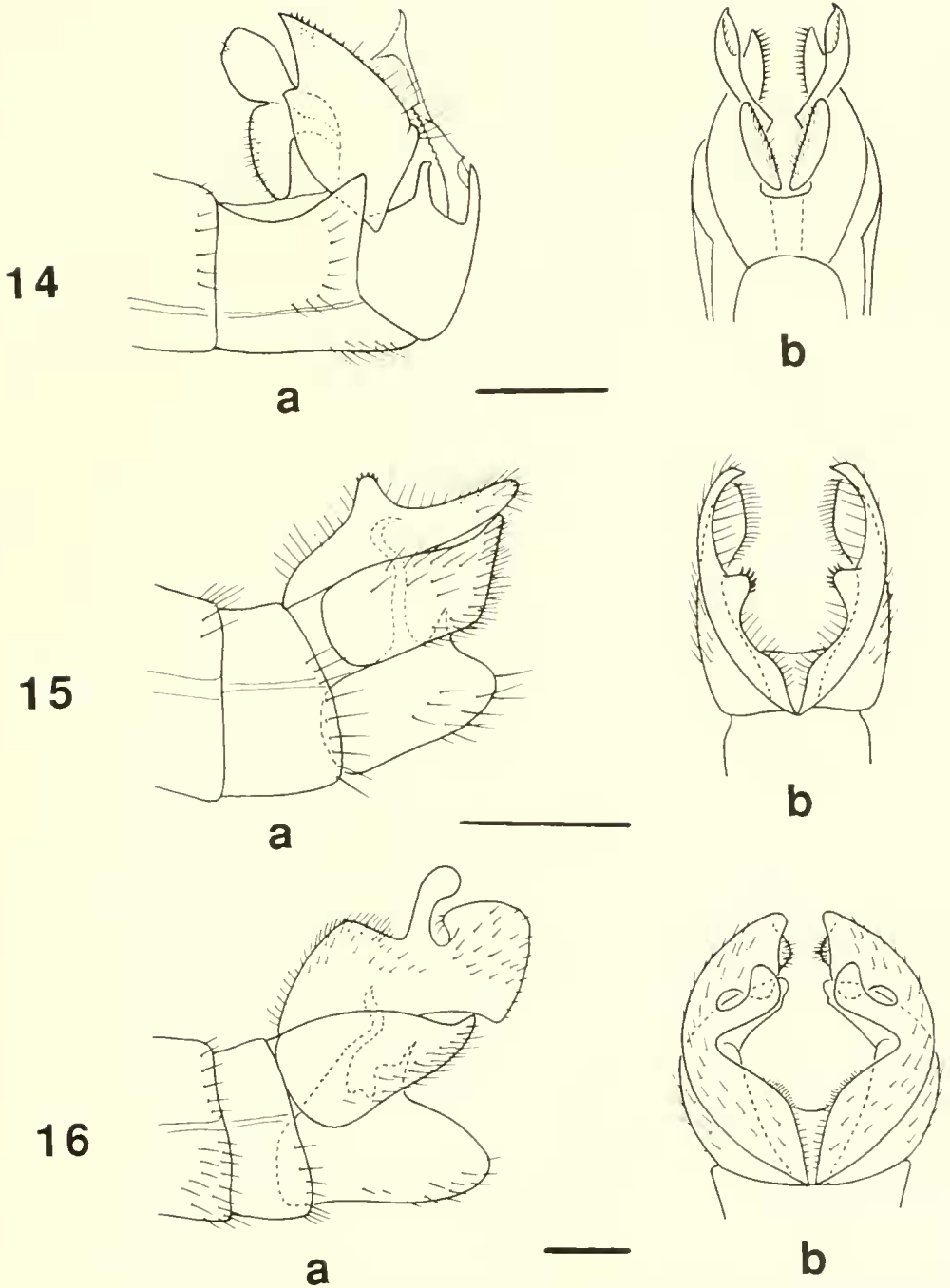
NEW SPECIES

Figs. 2, 31

Diagnosis.—This species is a member of the *C. notata* group. Male terminalia, described below, distinguish them from males of related Nearctic species. Concolorous golden brown coloration separates females (and males) from those of other species possessing both a wing stigma and a well-developed ovipositor.

Description.—Male: Length including terminalia 3.2–3.8 mm. General body color golden brown, abdomen and terminalia darker golden brown. *Head*: black; mouthparts yellow, palps yellowish white; antenna nearly concolorous pale yellow, except flagellum with orange tinge on dorsal surface and stylus yellowish brown. *Thorax*: scutum golden brown, pruinose, 2 faint, grayish brown stripes laterally; postnotum brown; humeral region shiny brown; scutulum and pleura yellowish gray. *Legs* yellow, except distal 2 tarsomeres dark brown on mid and hind leg; mid femur ventrally with row of black setulae along middle third (see Fig. 1); mid tibia ventrally with distal row of black setae. *Wing*: hyaline; stigma (see Fig. 30) well-developed, brown to dark brown. *Abdomen*: grayish brown. *Terminalia* (Fig. 2): nearly concolorous brown (cercus somewhat darker); cercus greatly broadened distally, with hook-like projection mid-way along median margin bearing 3 black setae; epandrial lobe narrowed apically, ending in row of bristles; anterior hypandrial process straight, sword-like; posterior hypandrial process longer, curved sharply posteriorly, ending in 3 spine-like projections.

Female: similar to male except length in-



Figs. 14-16. 14a (lateral) and b (dorsal), *Chelifera ensifera* male terminalia. 15a (lateral) and b (dorsal), *Chelifera stuprator* male terminalia. 16a (lateral) and b (dorsal), *Chelifera valida* male terminalia. Hypandrium omitted in dorsal view. Phallus omitted. Scale bar = 0.25 mm.

cluding terminalia 3.8–4.4 mm, body color somewhat darker, and lacking leg vestiture of male; ovipositor well-developed (see Fig. 27).

Type material.—Holotype male, labeled "On tundra/Cold Bay, 163°W/Alaska 26-VII/1952, W. R. Mason" (CNC, type no. 21330). The specimen is in good condition and most of the diagnostic features of terminalia visible without maceration. The type locality is on the Alaska Peninsula about 1100 kilometers southwest of Anchorage, Alaska. Allotype, same data as holotype (CNC). Paratypes. CANADA. British Columbia: 3 females, Summit Lk., Jul (CNC). Yukon Territory: 1 male, Lone Tree Crk., M 816 of Alaskan Hwy., Aug (CAS). UNITED STATES. Alaska: 9 males, 5 females, same data as holotype; 2 males, King Salmon, Naknek R., Aug (CNC).

Distribution.—This species is known only from the Alaskan Peninsula and southeast into extreme northern British Columbia (Fig. 31).

Etymology.—The specific epithet is from the Latin word "circinatus," for coiled or curled away from the apex, in reference to the pair of distinctively curled posterior hypandrial processes that arise from the hypandrium.

Remarks.—Males of *C. circinata* closely resemble those of a Palearctic species, *C. concinnicauda* Collin, but examination of a male of the latter that was labeled syntype (BMNH, examined Dec. 1989) revealed distinct differences in the shape of the cercus and in the hypandrial processes (compare Fig. 2 here with Fig. 291 of Collin, 1961).

Chelifera cirrata Melander

Figs. 12, 26, 27, 33

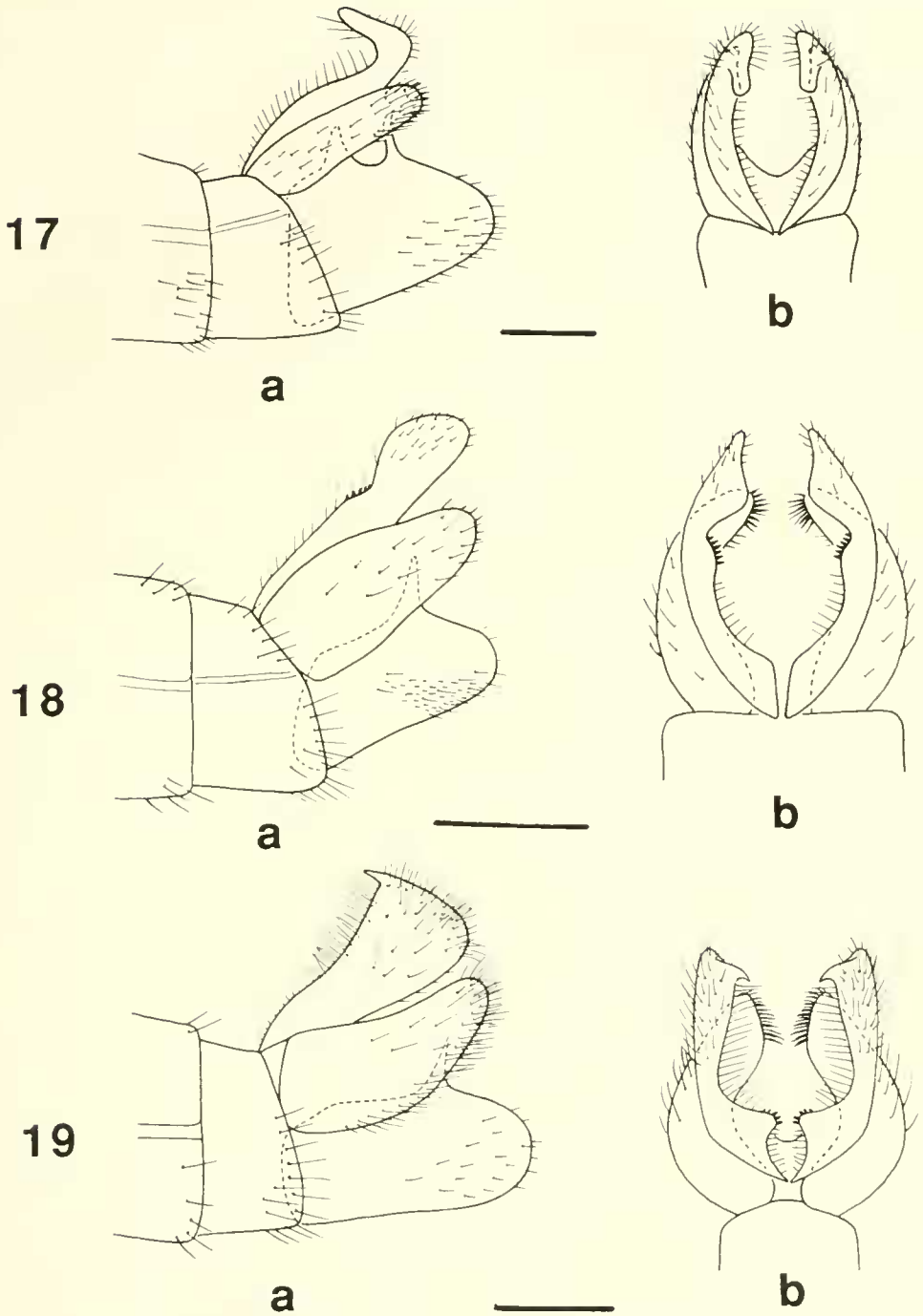
Chelifera cirrata Melander, 1947: 254.

Diagnosis.—This is the nominal species of the *C. cirrata* group. Males possess a distinctive cercus, described below, and areas of darker thoracic pigmentation against a paler background. Females are difficult to

separate from those of *C. ensifera* and *C. subensifera*, but, like conspecific males, usually possess contrasting pigmentation patterns on the thorax.

Description.—Male: length including terminalia 3.0–3.4 mm. General body color yellowish gold to golden brown, usually with contrasting areas of darker pigmentation on the thorax. *Head*: black; antenna yellow to light reddish brown, stylus reddish brown. *Thorax*: yellowish gold to golden brown background, usually with darker median stripe on scutum and darker above and posterior to humeral region. Legs yellow, except distal 2 tarsomeres light brown; fore tibia (Fig. 26) ventrally with 2 complete rows of black setulae, outer row stronger; mid leg lacking prominent vestiture. Wing hyaline, stigma lacking; M_1 1.5–2.0 × length of stem M_{1+2} . *Abdomen*: terga light brown to dark brown, sterna paler brown; abdominal tergum 8 greatly expanded posteriorly into lateral lobes overlapping hypandrium and basal portion of each epandrial lobe. Terminalia (Fig. 12): nearly concolorous yellowish brown, contrasting with darker abdominal terga; cercus arched basally, ending in pointed triangular process; epandrial lobe narrowed apicodorsally, strong setae lining inner surface apically, group of long, curved setae basally; anterior hypandrial process short and thick, projecting posteriorly; posterior hypandrial process even shorter, bluntly pointed apically. Female: similar to male except length including terminalia 3.8–4.0 mm and lacking development of abdominal tergum 8; ovipositor well-developed (Fig. 27).

Type material examined.—Holotype male, labeled "Yellst Park/Lava Creek/5 Jul 1923/A L Melander" (USNM); the type locality is in Yellowstone Park, Wyoming. The specimen is in fair condition, lacking the right wing, right mid leg, and right hind leg. Prior to my examination, the terminalia had been macerated and the dissected pieces placed in a glycerin microvial attached to the pin. Although only portions of the ter-



Figs. 17-19. 17a (lateral) and b (dorsal), *Chelifera recurvata* male terminalia. 18a (lateral) and b (dorsal), *Chelifera obsoleta* male terminalia. 19a (lateral) and b (dorsal), *Chelifera palloris* male terminalia. Hypandrium omitted in dorsal view. Phallus omitted. Scale bar = 0.25 mm.

minalia exist, the diagnostic features of the cercus, epandrial lobe and hypandrium are discernable.

Other specimens examined.—CANADA. British Columbia: 2 females, Kootenay Nat. Prk., Dolly Varden Cr., Jul; 1 female, 1 male, Yoho Nat. Prk., Yolo Valley Cr., Jul (CAS). UNITED STATES. California: Fresno Co., 1 female, 4 males, Huntington L., Badger Flat empgr., Jul-Aug; 1 male, Landslide Crk., May (MAC); 3 males, Inyo Co., Rock Crk., Jun (USNM). Idaho: 1 male, Caribou Co., Kendall Crk., Jun (USU). Montana: 1 female, Glacier Nat. Prk., Avalanche Crk., Jul (USNM). Oregon: Clackamas Co.; 1 male, Camp Crk. empgr., Jun; 1 female, Clear Cr., Jun (CAS); 4 males, 3 females, Mt. Hood Nat. For., 12 km E. Government Camp, Jul (CNC). Utah: 1 male, Cache Co., Logan Cyn., Jun (USU). Washington: 5 females, 6 males, American R., 10 mi E. Chinook Pass, Jul (WSU). Wyoming: 1 female, Spring Cr., Yellowstone Nat. Prk., Jul (USNM).

Distribution.—This species occurs widely at higher elevations of western North America from the central Rocky Mountains west to California and British Columbia (Fig. 33).

Chelifera defecta (Loew)
Figs. 20, 35

Hemerodromia defecta Loew, 1862: 210.
Thanategia defecta (Loew); Melander, 1928: 263.
Chelifera knutsoni Lavallee, 1975: 96.

Diagnosis.—Males are easily distinguished from those of similar yellowish Nearctic species by their distinctive cercus, which is abruptly darkened and broadly excavated over its distal third. Females key out with females of *C. banksi* (see remarks under *C. banksi*); absence of pigmented abdominal terga distinguishes females of the former two species from those of *C. rastroferi*, all of which possess a weakly developed ovipositor.

Description.—Male: length including ter-

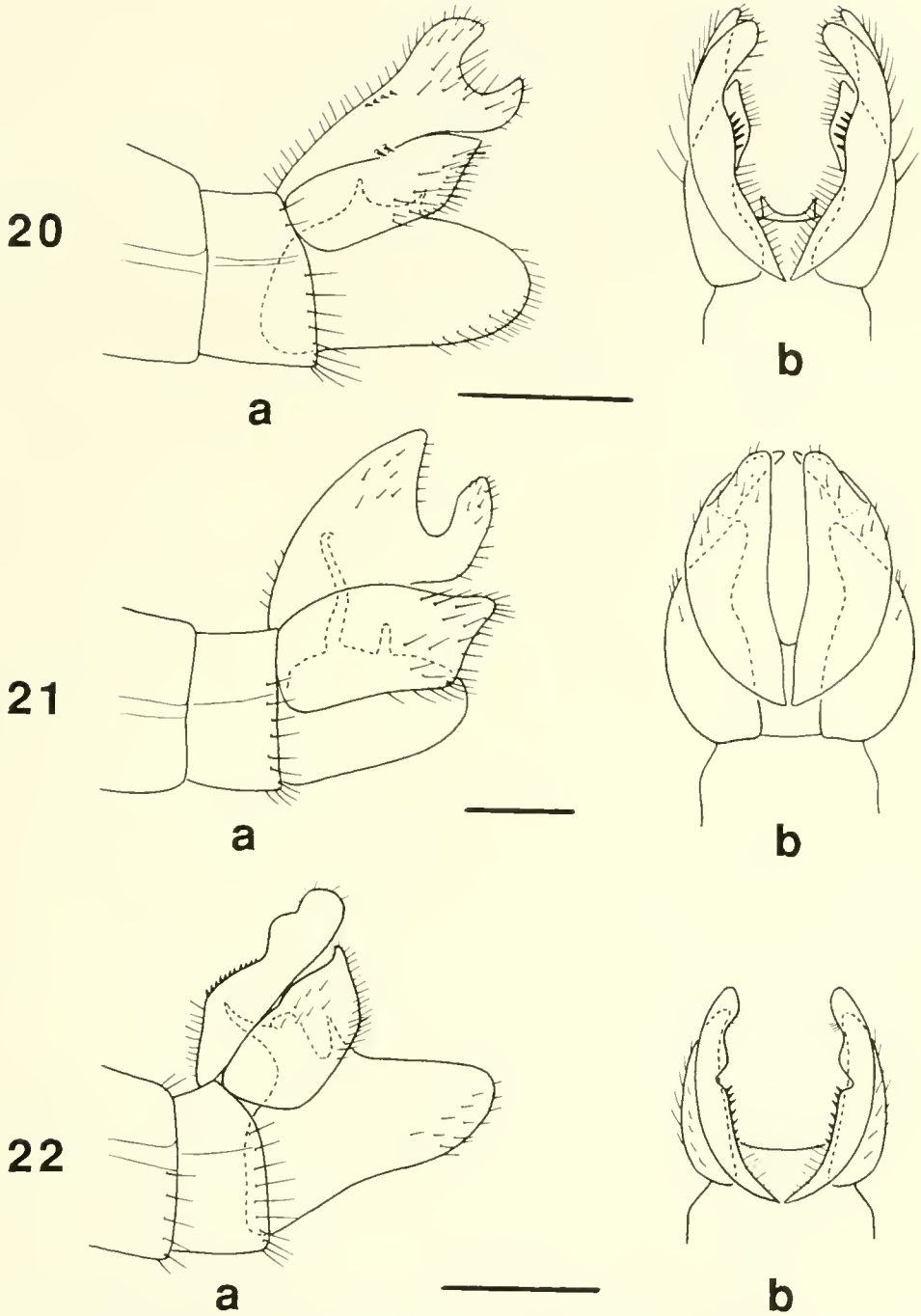
minalia 3.0–3.2 mm. General body color yellow. Head: black; antenna yellowish white. *Thorax*: scutum yellow to orange, sparsely pruinose. Legs yellowish white, except distal 2 tarsomeres light brown; mid leg lacking prominent vestiture. Wing hyaline, stigma lacking; dm-cu absent or partial in one or both wings on nearly all specimens. *Abdomen*: yellow. Terminalia (Fig. 20): yellow, except cercus dark brown to black over distal third; cercus broadly excavated distally, inner surface with 2 rows of black setulae midway, 2–3 in ventral row and 4–5 in dorsal row; anterior and posterior hypandrial processes very short, pointed apically. Female: similar to male except length including terminalia 3.4–3.6 mm; ovipositor weakly developed (see Fig. 28).

Type material examined.—*Hemerodromia defecta* Loew, holotype male: top label "Loew," bottom label "defecta" (MCZ, type number 1646). The specimen is in excellent condition and most of the diagnostic features of terminalia visible without maceration. According to Loew (1862; pg. 210), the specimen is from "District Columbia." *Chelifera knutsoni* Lavallee, holotype male, labeled "Coweeta Hydro. Lab./Macon Co., N. C./ix-9 1973/A. G. Lavallee" (USNM type number 73191). The specimen is in excellent condition and most of the diagnostic features of terminalia visible without maceration.

Other specimens examined.—CANADA. Nova Scotia: 1 female, Cape Breton Nat. Prk., Jul; 1 female, Springfield, Aug (CNC). Quebec: 1 female, Beech Grove, Jun (CNC). UNITED STATES. New Hampshire: 4 females, 8 males, Carroll Co., Wonalancet, Jul–Oct (UNH). North Carolina: Macon Co., 3 females, 2 males, Coweeta, Sep; 2 females, 1 male, Wayah Gap, Aug (CNC, USNM).

Distribution.—This species is known from eastern Canada south into the southern Appalachian Mountains (Fig. 35).

Remarks.—Males of *C. defecta* resemble those of a Palearctic species, *C. astigma* Collin (holotype male, BMNH, examined



Figs. 20-22. 20a (lateral) and b (dorsal), *Chelyfera defecta* male terminalia. 21a (lateral) and b (dorsal), *Chelyfera banksi* male terminalia. 22a (lateral) and b (dorsal), *Chelyfera rastrifera* male terminalia. Hypandrium omitted in dorsal view. Phallus omitted. Scale bar = 0.25 mm.

Dec. 1989), but terminalia of the two species are distinct. The type of *C. astigma* possesses a concolorous brown cercus of distinctly different shape.

The amount of expression of crossvein dm-cu in one or both wings varies among specimens of *C. defecta*, but cell dm almost always is "open" apically in at least one wing. When present, the reduced venation of females distinguishes them from similar appearing females of other *Chelifera* species in eastern North America. This reduced venation previously was the basis for recognizing *Thanategia*, which was synonymized with *Chelifera* by MacDonald (1988), who also placed *C. knutsoni* as a junior synonym of *C. defecta*.

Chelifera ensifera Melander

Figs. 14, 33

Chelifera ensifera Melander, 1947: 254.

Diagnosis.—This species is a member of the *C. cirrata* group. Both sexes of *C. ensifera* and *C. subensifera*, newly described below, appear separable based on the difference in coloration of the distal tarsomeres, as stated in the keys. However, with so few specimens available for study, the extent of color variation is unknown. Male terminalia of these two species, while similar in structure, are distinct. Diagnostic features of *C. ensifera* include a broadly oval cercus, with a transverse ridge on its inner surface, and 6–8 blunt teeth along the anterior surface of the phallus. Similar features of males of *C. subensifera* include a much narrower cercus, which lacks a transverse ridge on its inner surface, and 4–5 pointed teeth on the anterior surface of the phallus. Both sexes of these two species differ from those of *C. cirrata* in lacking pigmentation patterns on the thorax.

Description.—Male: length including terminalia ca. 3.4 mm. Generally body color light brown to reddish brown. *Head*: black; antenna yellow, except stylus light reddish brown. *Thorax*: nearly concolorous reddish

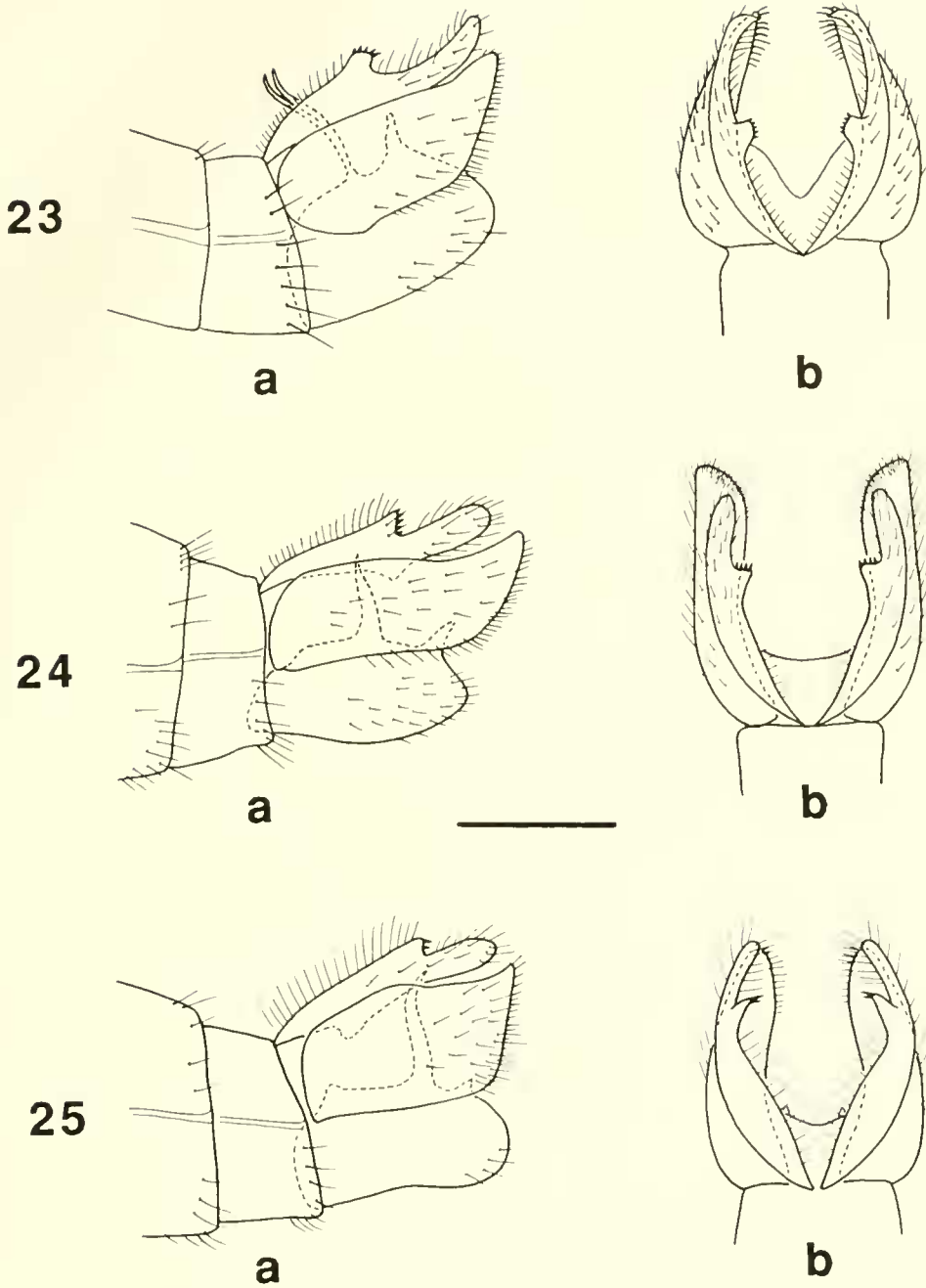
brown (light brown with darker pigmentation anteriorly on scutum on one specimen). Legs yellow, except distal 2 tarsomeres brown; fore tibia (see Fig. 26) ventrally with 2 complete rows of black setulae; mid tibia lacking prominent vestiture. Wings hyaline, stigma lacking; M_1 ca. $1.5 \times$ longer than stem M_{1+2} . *Abdomen*: tergum 8 greatly expanded posteriorly into lateral lobes overlapping hypandrium and basal portion of each epandrial lobe. Terminalia (Fig. 14); cercus reddish brown, contrasting with paler brown epandrial lobe and hypandrium; cercus ending in oval lobe, with sclerotized ridge across inner surface; anterior hypandrial processes short and straight; phallus (incompletely resolved) with 6–8 blunt teeth along anterior margin, visible on macerated specimen. Female: similar to male except length including terminalia 4.0–4.4 mm and lacking development of abdominal tergum 8; ovipositor well-developed (see Fig. 27).

Type material examined.—Holotype male, labeled "Lk. Crescent/Piedmont Wash/July 26, 1917/A. L. Melander" (USNM). The specimen is in excellent condition, with terminalia that had been macerated prior to my examination placed in a glycerin microvial attached to pin. The type locality is in Clallum County, immediately north of Olympic National Park on the north shore of Lake Crescent in Washington state.

Other specimens examined.—Washington: 1 male, 1 female, Bogachiel R., Olympic Pen., Jun (CAS).

Distribution.—This species is known only from only three specimens collected on the Olympic Peninsula of Washington (Fig. 33).

Remarks.—With so few specimens of *C. ensifera* available for study (including only one macerated male), all details of the terminalia were not resolved and the variation in body coloration and tarsal coloration is not known. The situation pertaining to this species is complicated by the existence of one male and two females collected in Lane Co. Oregon (by Paul Arnaud, Jr.). These three specimens are distinctly smaller than



Figs. 23–25. 23a (lateral) and b (dorsal), *Chelifera lovetti* male terminalia. 24a (lateral) and b (dorsal), *Chelifera multidentata* male terminalia. 25a (lateral) and b (dorsal), *Chelifera bidenta* male terminalia. Hypandrium omitted in dorsal view. Phallus omitted. Scale bar = 0.25 mm.

the three specimens of *C. ensifera* known from Washington, are uniformly paler in coloration, and lack crossvein dm-cu in both wings. However, the macerated terminalia of the male appear to be identical to those of *C. ensifera* described above.

Chelifera lovetti Melander

Figs. 23, 35

Chelifera lovetti Melander, 1947: 255.

Diagnosis.—*Chelifera lovetti* is the only species from the western United States whose adults usually possess an orange tinge on the posterior aspects of the head, but this coloration is lacking on some specimens. Males are distinguished by their terminalia, as described below, and in part also by the phallus that projects dorsally well above the cercus. Females lack a well-developed ovipositor and so they differ from females of other western species, except *C. palloris*.

Description.—Male: length including terminalia 3.0–3.2 mm. General coloration yellowish brown with light reddish tinge. *Head*: usually with orange coloration on vertex, occiput, postgena, and much of gena. Antenna yellowish white to light reddish brown, with flagellum and stylus paler than scape and pedicel. *Thorax*: concolorous yellowish brown with light reddish tinge, occasionally with faint lateral stripes on scutum; humeral region usually paler than scutum. Legs yellow, occasionally with yellowish brown distal tarsomere; mid leg lacking prominent vestiture. Wing stigma lacking. *Abdomen*: terga yellowish brown with light reddish tinge. Terminalia (Fig. 23): nearly concolorous light brown, cercus brown to dark brown especially over distal third; cercus with thumb-like, mid-dorsal process bearing row of black setulae; anterior hypandrial process very long and slender, curved posterior at apex; posterior hypandrial process much shorter and thicker. Female: similar to male except length including terminalia 3.3–3.8 mm; ovipositor weakly developed (see Fig. 28).

Type material examined.—Holotype male, labeled "Mt Hood Or/Hood Rapids/ 29 Jul '21/A L Melander" (USNM). The specimen is in excellent condition, with terminalia macerated prior to my examination dissected placed in a glycerin microvial attached to pin. The type locality is in Hood River County southwest of Hood River, Oregon. Paratypes. Idaho: 5 males, 4 females, Latah Co., Moscow, Jul–Aug (USNM). Washington: 1 female, Adna, Jul; 4 males, 3 females, Everett, Jul; 1 female, Lk. Crescent, Jul; 1 male, 1 female, Lk. Cushman, Jul; 1 female, Mt. Baker, Skyline Tr., Aug; 1 female, Mt. Ranier, Summerland, Jul; 2 females, Tokeland, Jul (USNM).

Other specimens examined.—CANADA. British Columbia: 5 males, 4 females, Mt. Revelstoke, Jul (CAS, USNM). UNITED STATES. California: 2 males, 3 females, Fresno Co., Bear Crk., Aug; 2 females, El Dorado Co., 8 km S. Polloch Pines, Jun; 1 female, Mariposa Co., 7 mi ENE Fishcamp, Jul; 3 males, 1 female, Sierra Co., 2.8 km E. Downieville, Jul (CAS); 1 male, Tulare Co., Weston Mdw., Jun (MAC); 2 males, Mt. Home, Jul (USNM); 1 male, San Bernadino Co., Kilpecker Crk., Jun (UCR). Idaho: 20 males, 45 females, 10 and 25 mi N. Harrison, Coeur d'Alene Lk., Jul (WSU). Oregon: 4 males, Joseph, Jul (CAS, USNM); 1 male, 1 female Clackamas Co., Hwy. 26 at Timberline Lodge junct., Jun (WSU); 1 male, Dead Man Pass, Jul; 1 female, Mt. Hood, Jul (USNM). Washington: 1 male, Olympic Nat. Prk., Hoh R., Jul (CAS); 7 males, 8 females, Mt. Ranier Nat. Pk., Aug; 1 male, Spokane Co., Spokane St. Prk., Jul (WSU).

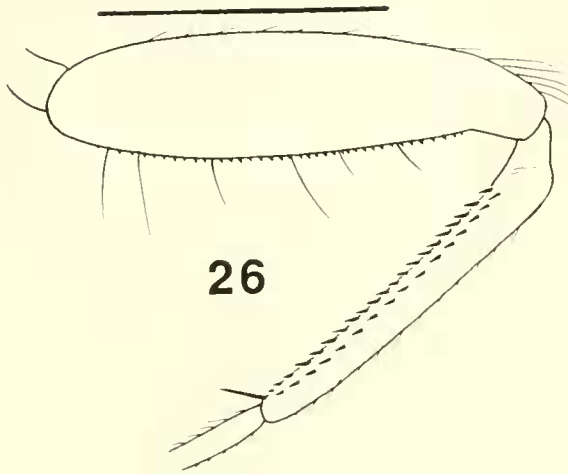
Distribution.—This species is known from southern British Columbia south into extreme southern California (Fig. 35).

Chelifera mana Lavallee

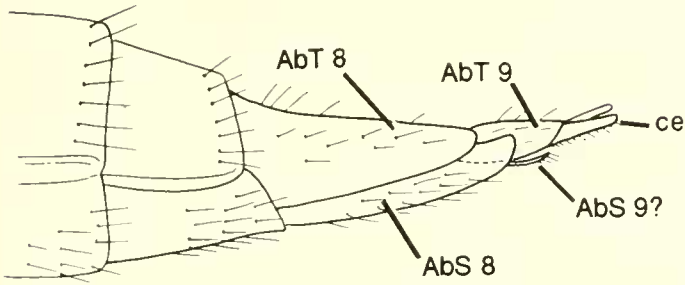
Figs. 11, 32

Chelifera mana Lavallee, 1975: 95.

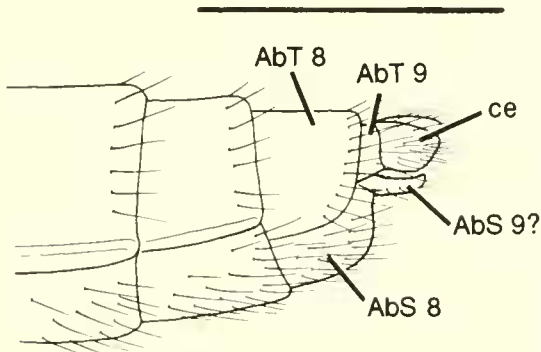
Diagnosis.—This species is a member of the *C. varix* group. Males closely resemble



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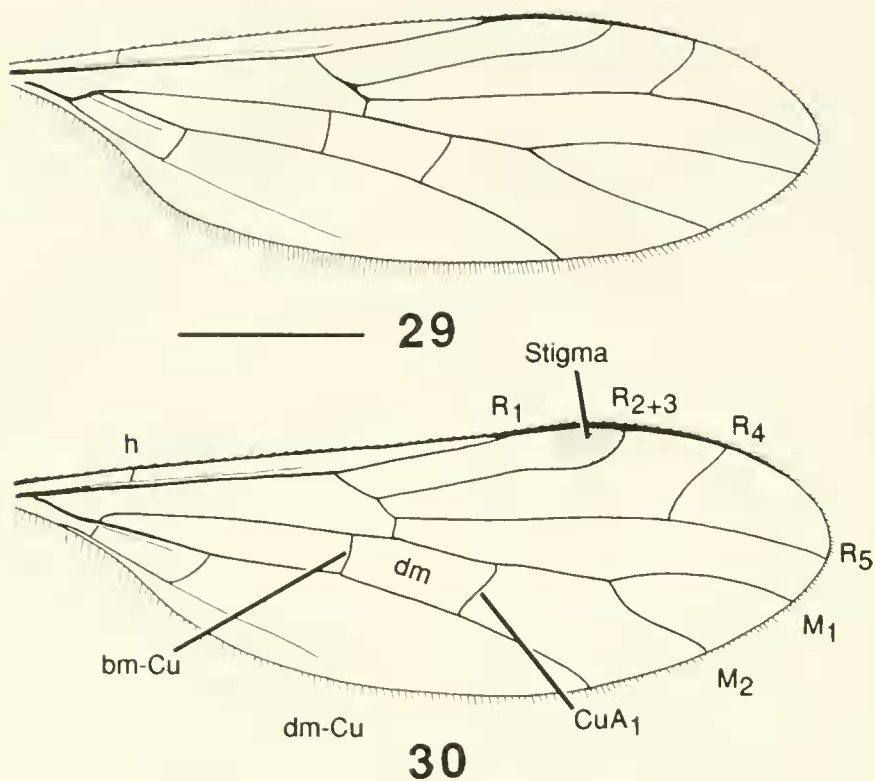


27



28

Figs. 26-28. 26, *Chelifera cirrata* female fore tibia. 27, *Chelifera cirrata* female terminalia. 28, *Chelifera palloris* female terminalia. AbS 8 = abdominal sternum eight; AbS 9? = abdominal sternum ten; AbT 8 = abdominal tergum eight; AbT 10 = abdominal tergum ten; ce = cercus. Scale bar = 0.5 mm.



Figs. 29–30. 29, *Chelifera chvalai* wing. 30, *Chelifera caliga* wing. Scale bar = 1.0 mm.

those of *C. varix*, but lack a darkly pigmented patch midway along the inner surface of the fore tibia that distinguishes males of *C. varix*. Females of *C. mana* and *C. varix* are distinguished from those of other western species that possess a well-developed ovipositor by their nearly concolorous yellow coloration. Dark pigmentation on the abdominal terga on females of *C. mana* distinguishes them from females of *C. varix*.

Description.—Male: length including terminalia ca. 3.2 mm. General body color yellow. **Head:** black; antenna yellowish white. **Thorax:** yellow, occasionally with orange tinge; scutum sparsely pruinose; pleura densely pruinose. Legs yellow, except distal 1–3 tarsomeres light brown and inner surface of fore femur with darkly pigmented, crescent-shaped patterns; fore femur greatly swollen, diam. ca. 3× that of fore tibia, with distal process bearing dense fringe of golden setae (see Fig. 7); mid femur with basal

swelling bearing 3 yellow bristles; mid tibia ventrally with 2 rows of black setae on distal half. Wing stigma lacking. **Abdomen:** yellow, except median area of terga dark brown. **Terminalia** (Fig. 11): yellow; cercus with median margin nearly straight and bearing black setulae; anterior hypandrial process short, nearly straight; posterior hypandrial process longer and thicker, curved anteriorly toward apex. Female: similar to male except length including terminalia ca. 3.6 mm and lacking distinctive features and vestiture of legs; ovipositor well-developed (see Fig. 27).

Type material examined.—Holotype male, labeled "San Isabel Nat. For., Bear"/Lake, cir., 8 mi SW Cuhara/Colo., off Colo. Rt. 12; cir. 10000' elev. A Lavallee," with handwritten date on margin of label "Aug. 18, 1973" (USNM, type no. 73190). The specimen is in excellent condition and most of the diagnostic features of terminalia vis-

ible without maceration. The type locality is near the border of Huerfano and Las Animas counties about 50 kilometers northwest of Trinidad, Colorado. Paratypes. Colorado: 1 male, 18 mi E Aspen, Aug; 1 female, same data as holotype (CNC).

Other specimens examined.—Colorado: 1 male, Aspen, Jul; 1 female, Bear Lk. ca. 8 mi SW Cuhara, Aug (AMNH); 3 males, 1 female, Chaffee Co., Garfield, Aug (CAS); 1 male, 2 females, Mt. Evans, Doolittle Ranch, Jul–Aug; 1 male, Mt. Evans, Echo L., Jul; 1 male, Clear Creek Co., Chicago Cr., Aug (CNC); 1 male, 1 female, Bear Lk., ca. 8 mi SW Cuhara, Aug (USNM). Utah: 2 males, Boulder, Aug (USNM). Wyoming: 1 male, Carbon Co., 20 km W. Centennial, Aug (CAS).

Distribution.—This species is known from the central Rocky Mountains (Fig. 32).

Chelifera multidentata MacDonald,

NEW SPECIES

Figs. 24, 34

Diagnosis.—The unusual pale coloration of the head distinguishes adults of *C. multidentata* from those of other species of *Chelifera* found in eastern North America that are concolorous yellow. Male terminalia resemble those of *C. bidentata*, described above from central California, but are distinct in possessing a row of 5 black setulae on the cercus instead of 2 such setulae. In addition, a pair of strong, black “brushes” are visible on the macerated male and appear to be associated with base of the phallus.

Description.—Male: Length including terminalia ca. 3.3 mm. General body color yellow. *Head*: vertex, occiput, postgena, and gena yellow with orange tinge; frons grayish; mouthparts yellow; palps nearly white; antenna yellow. *Thorax*: yellow, pruinose. *Legs*: yellow, except distal 2–3 tarsomeres light brown; mid leg lacking prominent vestiture. *Wing*: hyaline, stigma lacking. *Abdomen*: yellow. *Terminalia* (Fig. 24): shiny yellow; cercus narrowed distally, with 5 black setulae midway along straight surface perpendicular to the mediodorsal margin;

anterior hypandrial process thick basally, elongated and sharply narrowed toward apex; posterior hypandrial process much shorter and straight.

Female: similar to male except length including terminalia 3.6–3.8 mm; ovipositor moderately developed (resembling Fig. 27, but shorter, less sclerotized and nearly matte).

Type material.—Holotype male, labeled “USA: NC: Swain Co./Great Smoky Mtns. N. P./15. VI. 1990, Newfound/Gap B. J. Sinclair/ex. sweeping” (CNC, holotype number 21331). The specimen is in excellent condition and most of the diagnostic features of terminalia visible without maceration. The type locality is in Great Smoky Mountains National Park. Allotype, labeled “Gr. Smoky Mt./Nat. Pk., N. C. 2. VII-1957/J. R. Vockeroth” (CNC). Paratypes. North Carolina: 2 males, 2 females, same data as allotype (CNC). Tennessee: 1 male (macerated terminalia in glycerin microvial attached to pin), 2 females, Great Smoky Mts. Nat. Prk., Indian Gap, Aug (CNC).

Distribution.—This species is known only from along the crest of Great Smoky Mountains National Park near the North Carolina-Tennessee border (Fig. 34).

Etymology.—The specific epithet is formed from the Latin “multi,” for many, and “denta,” for tooth, in reference to the diagnostic row of black setulae on each cercus.

Chelifera neangusta MacDonald,

NEW SPECIES

Figs. 6, 31

Diagnosis.—This species is a member of the *C. notata* group. Male terminalia distinguish them from the related species treated in this study. The most distinctive features visible in the macerated male of *C. neangusta* are the two pairs of strongly developed hypandrial processes, with the posterior pair being especially large.

Description.—Male: Length including terminalia 3.2–3.5 mm. General body color golden brown. *Head*: black; antenna yellow-



Fig. 31. Distribution of *C. caliga*, *C. circinata*, *C. neangusta*, *C. notata*, and *C. subnotata*.



Fig. 32. Distribution of *C. chvalai*, *C. mana* and *C. varix*.

ish white, stylus yellow. *Thorax*: golden brown; lateral stripes on scutum developed on posterior third only; scutellum light brown; postnotum brown; pleura golden brown; humeral region dark, shiny. *Legs*: yellow, except distal 1–2 tarsomeres light brown; mid femur with ventral row of black setulae along mid third (see Fig. 1); mid tibia ventrally with distal row of black setae. *Wing* hyaline; stigma (see Fig. 30) round and dark brown. *Abdomen*: sterna and terga brown. *Terminalia* (Fig. 6): cercus brown, slender, smoothly undulant dorsally, with strong black setula basomedially; epandrial lobe yellow, except brown along undulant dorsal margin, ending in strong bristle; anterior hypandrial process thick basally, narrowed and bent anteriorly at apex; posterior hypandrial process longer, thick basally, strongly narrowed apically and straight.

Female: unknown.

Type material.—Holotype male, top label "NEW MEXICO/Cherry Creek/Pinos Altos/22 June 1953" and bottom label "WW Wirth/collector" (USNM). The specimen is in excellent condition, but is glued onto top of point, right side up; although not dissected, some diagnostic features of terminalia are visible. The type locality is in Grant County about 10 kilometers north of Silver City, New Mexico. Paratype, Utah: 1 male (macerated terminalia in glycerin microvial attached to pin), Washington Co., Leeds Cyn., Jun (USU).

Distribution.—This species is known from only two localities, western New Mexico and southwestern Utah (Fig. 31).

Etymology.—The specific epithet is a combination of the Latin root "ne," for not, and "angusta," alluding to the distinction between this species and *C. angusta*.

Remarks.—The two known males of this species resemble those of the Palearctic species, *C. angusta* Collin (3 syntypes, British Museum, examined Dec. 1989), but differ in coloration and possess a more strongly developed wing stigma. More importantly,

distinct differences in terminalia exist, including the structure of the anterior and posterior hypandrial processes (see Fig. 292 of Collin, 1961).

Chelifera notata (Loew)

Figs. 3, 31

Hemerodromia notata Loew, 1862: 209.

Diagnosis.—This species is the nominal species of the *C. notata* group. Adults are characterized by a broad, dark median stripe on the scutum, similar to that found on those of *C. subnotata*, newly described below. The uniformly slender cercus on males of *C. notata* is distinct from that in males of *C. subnotata* (see description below). Females of these two species appear to be inseparable.

Description.—Male: length including terminalia ca. 3.6 mm. General body color grayish brown, with darker median strip on scutum. *Head*: black; antenna yellowish white, stylus light brown. *Thorax*: grayish brown, with reddish black stripe medially on scutum, gradually broadening posteriorly and filling scutal depression; scutellum light reddish brown; postnotum reddish black; pleura grayish brown; humeral region dark brown, shiny; reddish black patch in postalar area. *Legs* yellow, except distal tarsomere light brown; mid femur (see Fig. 1) with ventral row of black setulae along mid third; mid tibia ventrally with 2 distal rows of brown setae. *Wing* hyaline; stigma well developed, brown; R_{2+3} curved around posterior margin of stigma. *Abdomen*: grayish brown. *Terminalia* (Fig. 3): cercus brown, slender, dorsal margin undulant, with strong black setula basomedially; epandrial lobe yellow (except extreme dorsal margin brown), dorsal margin undulant in lateral view. 2 blunt setae at apex; anterior hypandrial process long, smoothly curved posteriorly, with bluntly pointed tip; posterior hypandrial process slightly longer, sharply hooked posteriorly at apex. Female: similar to male except length including terminalia



Fig. 33. Distribution of *C. cirrata*, *C. ensifera* and *C. subensifera*.

ca. 4.0 mm and lacking prominent vestiture on mid leg; ovipositor well-developed (see Fig. 27).

Type material examined.—Holotype female, with an upper label "Penns." and lower label "notata" (MCZ, type number 13091); although the label states "Penns.," Loew (1862: pg. 209) suggests "Illinois" as the collecting site. The specimen is in excellent condition.

Other specimens examined.—New Hampshire: 1 male, 5 females, Carroll Co., Wonalancet, Aug–Oct (UNH); 1 male (macerated terminalia in glycerin microvial attached to pin), Franconia (USNM).

Distribution.—This species is known only from two males collected in New Hampshire and, by the association described below for the holotype female from Pennsylvania (Fig. 31).

Remarks.—Inability to distinguish females of *C. notata* and *C. subnotata* precluded association of a male with a female holotype of *C. notata*. In agreement with Melander's (1947) concept of *C. notata*, which was supported by an illustration of male terminalia, a male possessing a uniformly slender cercus that is much darker than the epandrial lobes and hypandrium is associated with *C. notata* (see also remarks under *C. subnotata*).

Chelifera obsoleta (Loew)

Figs. 18, 36

Hemerodromia obsoleta Loew, 1862: 208.

Diagnosis.—Adults are characterized by prominent pigmentation patterns on the thorax, especially the dark strip above the notopleural suture. Male terminalia include an elongated cercus that is somewhat lobed distally and bears a row of black setulae midway along its inner margin.

Description.—Male: length including terminalia 3.5–3.8 mm. General body color brown with darker markings on thorax. *Head*: black; antenna yellow to light reddish brown. *Thorax*: golden brown; scutum with

2 thin, dark stripes laterally, dark strip above notopleural suture, and dark patch anterior to scutellum; scutellum and metanotum dark brown; mesopleuron with broad, dark patch anterodorsally. Legs yellowish, except distal 2–3 tarsomeres yellowish brown; mid leg lacking prominent vestiture. Wing hyaline, stigma lacking. *Abdomen*: terga light brown. Terminalia (Fig. 18): brown; cercus elongate, extending beyond epandrial lobe, smoothly broadened distally, bearing row of black setulae midway on inner margin; anterior hypandrial process not apparent; posterior hypandrial process short, straight. Female: similar to male except length including terminalia 4.0–4.2 mm; ovipositor weakly developed (see Fig. 28).

Type material examined.—Holotype female, upper label "Md" and lower label "obsoleta" (MCZ, type number 13090); although the labels state "Md.," Loew (1862: pg. 208) suggests "Illinois" as the collecting site. The specimen is in poor condition, but the diagnostic pigmentation pattern on the thorax is apparent. It lacks both wings, the hind legs, the mid legs, and all but the basal tarsomere of the left fore leg; also, the abdomen is separated from the thorax, and glued onto the top label.

Other specimens examined.—CANADA. Ontario: 1 male, Collingwood Township, May; 1 female, Simcoe, Jun (CNC). UNITED STATES. Connecticut: 2 males, 1 female, Redding, May (USNM). Georgia: Clarke Co., Athens, May (MAC). Indiana: 13 males, 20 females, 5 mi W. Lafayette, May–Sep (CNC, MAC, PERC). Massachusetts: 1 male, Forrest Hills (USNM). Michigan: 2 males, Cheboygan Co., Jul (USNM). New Hampshire: 1 female, White Mts., (USNM). New York: 1 male, 1 female, Hamburg, May; 1 female, Little Valley, Jun (CAS); 1 male, Bear Mt., Sep; 1 female, Millwood, Jun; 3 females, Oswego Co., Selkirk Shores St. Prk., Jun (USNM). North Carolina: 1 female, Black Mt., Swannanoa Frk., May (USNM). Pennsylvania: 1 male, Lewiston, Jun (USNM).



Fig. 34. Distribution of *C. bidenta*, *C. multidentata*, *C. recurvata*, *C. stuprator* and *C. valida*.

Distribution.—This species occurs in Eastern North America from the Great Lakes south into the southern Appalachian Mountains (Fig. 36).

Chelifera palloris (Coquillett)

Figs. 19, 28, 36

Mantipeza palloris Coquillett, 1895: 392.

Diagnosis.—Males possess distinctive terminalia, described below. Females are difficult to characterize, as reflected in the key, and may not always be distinguished from those of similar species (see remarks below).

Description.—Male: length including terminalia 3.8–4.2 mm. General body color yellowish brown to reddish black. *Head*: black; antenna yellowish white. *Thorax*: yellowish brown to reddish black, occasionally yellowish brown with 2 lateral, dark stripes on scutum; mesopleuron concolorous with scutum, darker patch sometimes present anterodorsally; postnotum usually dark brown. Legs yellow, except distal 2 tarsomeres; mid leg lacking prominent vestiture. Wing hyaline, stigma lacking. *Abdomen*: yellowish brown to dark brown. Terminalia (Fig. 19): nearly concolorous brown, hypandrium slightly darker and cercus slightly lighter brown; cercus pointed apicodorsally and broadly oval apicoventrally, with basomedian process bearing row of 6 black setulae; anterior hypandrial process not apparent; posterior hypandrial process slender, straight. Female: similar to male except length including terminalia 4.0–4.8 mm; ovipositor weakly developed (Fig. 28).

Type material examined.—Holotype female, upper label "White Mts./ Morrison"; lower label "Collection C. V. Riley" (USNM, type number 3153); the specimen is in excellent condition. The type locality is in the White Mountains of northcentral New Hampshire.

Other specimens examined.—CANADA, Alberta: 2 males, Banff, Aug (CAS). British

Columbia: 1 male, Terrace, May; 1 male, Penticton, Aug (CNC). Manitoba: 1 male, Shilo, Aug (CNC). New Brunswick: 4 males, 1 female, Kouchibouquac Nat. Prk., Jul (CNC). Newfoundland: 1 male, 3 females, St. Johns, Aug (CNC). Northwest Territories: 2 males, 1 female, Boyd Lk., Jul (CNC). Nova Scotia: 1 male, 11 females, Cape Breton Highlands Nat. Prk., Jul–Aug; 1 male, Mt. Uniache, Aug; 2 males, 3 females, Springfield, Aug (CNC). Ontario: 3 males, 1 female, Kearny, Jul; 1 male, Ottawa, Jun (CNC). Quebec: 3 males, Gr. Whale R., Aug; 1 male, Lac Phillippe, Jul; 1 male, 2 females, Indiana House Lk., Aug (CNC). Yukon Territory: 1 male, Takhini Hot Spr., Aug; 1 male, Boyd Lk., Jul (CNC). UNITED STATES. Alaska: 6 males, 1 female, Isabel Pass, mi 206 Richardson Hwy., Jul (CNC); 1 male, 5 females, Mt. McKinley Nat. Prk., Jun (UKL); 1 male, Savonshi, Naknet Lk., Jul (CAS). Colorado: 1 male, Boulder Co., Sep; 1 male, Vail Pass, Jul (USNM). Connecticut: 1 female, Candlewood Lk., Aug; 1 male, Redding, Jul (USNM). Maine: 1 female, Bar Harbor, Jul; 1 male, 1 female, Ft. Kent, Aug; 1 male, Kineo, Aug; 1 female, Mt. Katahdin, Aug; 1 female, Seal Harbor, Jul (USNM). Massachusetts: 1 male, Forrest Hills, Sep (USNM). Michigan: 1 male, Iron Co., Aug; 2 males, 3 females, Isle Royal, Aug (USNM); 2 males, Marquette Co., Big Bay, Jun (MAC). Minnesota: 1 male, 1 female, Basswood Lk., Jul (UMSP); 1 male, Eagle Nest, Jul (USNM). New Hampshire: 1 male, 3 females, Wonalancet, Aug–Sep; 10 males, 32 females, Coos Co., Jun–Oct; 2 females Rockingham Co., Odirone Pt., Sep–Oct (UNH); 2 males, 6 females, Franconia: 1 female, White Mts., Dolly Copp, Jul; 3 females, White Mts. (USNM). New York: 1 male, Franklin Co., Jul; 2 females, Fulton Co., Woodworths Lk., Aug (CU); 1 female, Lake Oneida, Sep (USNM). Pennsylvania: 7 males, Dubois, Sep; 2 females, Mineral Spg, Sep (USNM). Washington: 1 male, Keyport, Aug (USNM).

Distribution.—This is the most widely



Fig. 35. Distribution of *C. banksi*, *C. defecta*, *C. lovetti* and *C. rastrifera*.

occurring species of *Chelifera* in the Nearctic region, having been collected from Alaska, Canada, the northern United States and central Colorado (Fig. 36).

Remarks.—Adults of this species vary substantially in coloration. They may be nearly concolorous, usually yellow brown or, less commonly, light reddish brown. However, some specimens from the Northwest Territories and northeastern Quebec are light reddish black. Other males, and some females, are yellowish brown with a pair of dark, longitudinal stripes on the scutum and a darker patch on the mesopleuron anterodorsally. Examination of macerated male terminalia revealed no differences among males representing the entire range of coloration and no differences in terminalia exist among sympatric males of differing coloration.

Chelifera rastrifera Melander

Figs. 22, 35

Chelifera rastrifera Melander 1947: 257.

Diagnosis.—Males are distinguished by a yellow cercus that is lined with black setulae mediodorsally and is undulant along the dorsal margin. Pigmented abdominal terga distinguish females from those of other relatively small, yellow species of *Chelifera* found in eastern North America that also possess a black head.

Description.—Male: length including terminalia ca. 3.2 mm. General body color yellow. *Head*: black; antenna yellow, except stylus yellowish brown. *Thorax*: yellow, with golden tinge, densely pruinose. Legs yellowish white, except distal 2–3 tarsomeres light brown on mid and hind leg; mid leg lacking prominent vestiture. Wing hyaline, stigma lacking. *Abdomen*: yellow, except terga light brown medially. Terminalia (Fig. 22): yellow; cercus elongate, row of 10–12 black setulae mediodorsally, dorsal margin undulant; hypandrium bulbous apically, extending posteriorly well beyond epandrial lobe; anterior hypandrial process large ba-

sally, slender and curving posteriorly at apex; posterior hypandrial process much shorter, slender. Female: similar to male except length including terminalia ca. 3.4 mm; ovipositor weakly developed (see Fig. 28).

Type material examined.—Holotype male: top label "Black Mt./N. C. May"; next label "N. Fork/Swannanoa"; bottom label "collection/ N. Banks" (USNM). The specimen is in excellent condition and most of the diagnostic features of terminalia visible without maceration. The type locality is in Buncombe County about 15 kilometers northeast of Asheville, North Carolina.

Other specimens examined.—CANADA. Nova Scotia: 2 males, 1 female, Cape Breton Highlands Nat. Prk., Jul (CNC). Quebec: 1 female, Beech Grove, Jun; 1 male, Indiana House Lk., Jul; 1 male, Matapedia, Jul (CNC). UNITED STATES. North Carolina: 1 male, Black Mt., N. Frk. Swannanoa R., May (USNM).

Distribution.—This species is known from northern Quebec south into the southern Appalachian Mountains (Fig. 35).

Chelifera recurvata (Melander)

Figs. 17, 34

Thanategia recurvata Melander, 1947: 260.

Diagnosis.—Males are recognized by their large size, concolorous dark coloration, and distinctive cercus, described below. Females are much larger than females of *C. stuprator* and usually possess more complete venation. Females of *C. recurvata* and *C. valida* closely resemble each other, but the former lack well-developed scutal stripes and have an antennal flagellum that is much lighter in color, being nearly concolorous with the scape and pedicel.

Description.—Male: length including terminalia ca. 4.2 mm. General body color reddish brown to reddish black. *Head*: black; antenna yellow. *Thorax*: reddish brown to reddish black, densely pruinose; 2 weakly developed stripes laterally on scutum; postnotum dark brown. Legs yellow, except dis-

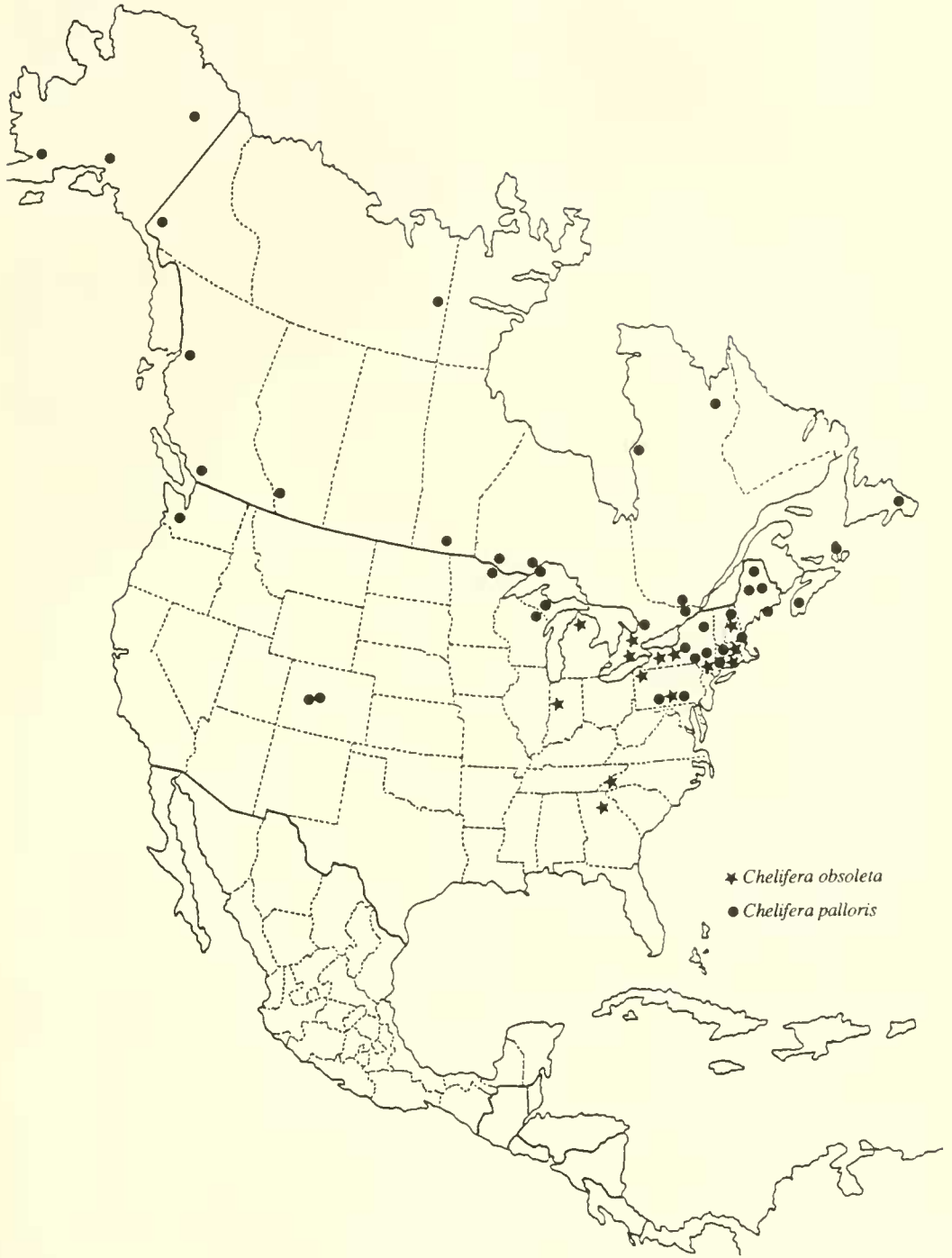


Fig. 36. Distribution of *C. obsoleta* and *C. palloris*.

tal 2 tarsomeres light brown; mid leg lacking prominent vestiture. Wing hyaline, stigma lacking; dm-cu often absent or incomplete in one or both wings; R_4 occasionally absent or partial on one wing. *Abdomen*: terga reddish brown to reddish black, sterna paler. Terminalia (Fig. 17): concolorous with abdominal terga; cercus long and slender, curving sharply upward and inward; anterior hypandrial process short and straight; posterior hypandrial process slightly longer, curving posteriorly at apex. Female: similar to male except length including terminalia 4.2–4.4 mm and distal 2 tarsomeres darker brown; ovipositor weakly developed (see Fig. 28).

Type material examined.—Holotype male, labeled "Nelson, B. C./ 17 VII - 10" (USNM). The specimen is in fair condition (lacking the head, front legs, and left middle leg), but the diagnostic features of terminalia are visible without maceration. The type locality is about 50 kilometers north of the border of Idaho and Washington near Nelson, British Columbia. Allotype, same data as holotype (USNM).

Other specimens examined.—CANADA, British Columbia: 1 male, Anderson Lk., nr. D'Arcy, Jun; 1 male, Summit Lk., mile 392 Alaskan Hwy., Jul (CNC); 1 male, Wells Gray Prov. Prk., Aug (CAS). Yukon Territory: 1 male, 1 female, La Force Lk., Jul; 2 males, 9 females, Little Salmon Lk., Aug (CNC). UNITED STATES. Alaska: 1 female, Cold Bay, Aug; 6 males, 2 females, Naknet, Jul–Aug (CNC).

Distribution.—This species occurs in southern Alaska, Yukon Territory and south into southern British Columbia (Fig. 34).

Chelifera stuprator (Melander)

Figs. 15, 34

Thanategia stuprator Melander, 1947: 259.

Diagnosis.—Males are characterized by light reddish black coloration, venation that typically is reduced, and the phallus that projects dorsally well above the cercus. Dif-

ferent terminalia and smaller size distinguish them from males of *C. valida* and darker coloration distinguishes them from males of *C. loveti*, which possess a cercus of similar structure. Females of *C. stuprator* are more difficult to characterize, but venation typically is reduced, and they are lighter in color and much smaller than those of *C. recurvata* and *C. valida*; they are darker in color than females of other relatively small species treated here that possess a weakly developed ovipositor.

Description.—Male: length including terminalia 3.0–3.2 mm. General body color reddish black. *Head*: black; antenna yellow. *Thorax*: reddish black. Legs yellow, except distal tarsomere light brown; mid leg lacking prominent vestiture. Wing hyaline, stigma lacking; dm-cu typically absent on both wings; R_4 often absent or partial on one or both wings, rarely complete on one wing. *Abdomen*: reddish black. Terminalia (Fig. 15): reddish black; cercus slender with mid-dorsal projection on inner surface bearing 5–6 black setulae; anterior hypandrial process long, slender, and bent sharply posteriorly at apex; posterior hypandrial process much shorter, straight. Female: similar to male except length including terminalia 3.8–4.0 mm and paler in coloration, reddish brown instead of reddish black; ovipositor weakly developed (see Fig. 28).

Type material examined.—Holotype male, labeled "Mt. Rainier/ Eagle Peak/ 19 July '32/ A L Melander" (USNM). The specimen is in excellent condition and most of the diagnostic features of terminalia visible without maceration. The type locality is in Lewis County, Mount Ranier National Park, about 2 kilometers east of Longmire, Washington.

Other specimens examined.—CANADA, British Columbia: 1 female, Squamish, Aug; 1 male, 2 females, Mt. Thornhill, nr. Terrace, Jul–Aug (CNC); 1 male, Mt. Revelstoke, Jul (USNM). UNITED STATES. Washington: 1 female, Mt. Baker, Skyline Trail, Aug; 1 male, Mt. Ranier, Summer-

land, Jul (USNM); 4 males, 28 females, Mt. Ranier Nat. Prk., Jul–Aug (WSU).

Distribution.—This species is known from the Cascade Mountains of Washington, and western and southeastern British Columbia (Fig. 34).

***Chelifera subensifera* MacDonald,**

NEW SPECIES

Figs. 13, 33

Diagnosis.—This species is a member of the *C. cirrata* group. Adults closely resemble those of *C. ensifera*, but both sexes of the two species appear separable on the basis of color differences in the distal tarsomere (see diagnosis and remarks under *C. ensifera*). The cercus of males of *C. subensifera* is diagnostic, as described below. Females of *C. subensifera* and *C. cirrata* are less readily distinguished, but the few females of *C. subensifera* examined lack contrastingly dark pigmentation patterns on the thorax.

Description.—Male. Length including terminalia ca. 2.8 mm. General body color brownish black. *Head*: black, frons grayish black, mouthparts and palps yellow. Antennal flagellum orange, scape and pedicel yellow, stylus brown. *Thorax*: reddish brown to nearly reddish black; scutum paler laterally and darker anteriorly. *Legs*: yellow, except distal tarsomere dark brown; fore tibia ventrally with 2 complete rows of black setulae (see Fig. 26); mid leg lacking prominent vestiture. *Wing*: hyaline, stigma lacking; M_1 ca. $1.5\times$ longer than stem M_{1+2} . *Abdomen*: terga brown to reddish black, sterna paler; abdominal tergum 8 greatly expanded posteriorly into lateral lobes overlapping hypandrium and basal portion of each epandrial lobe. *Terminalia* (Fig. 13): cercus brown, epandrial lobe and hypandrium yellow; cercus ending in narrow, spatula-shaped lobe, lacking internal ridge; epandrial lobe ending in apicodorsal projection, strong setae lining outer margin; anterior hypandrial process not apparent; posterior hypandrial process very short, curved

anteriorly at apex; phallus (incompletely resolved; apical portion missing) bearing 4–5 sharp teeth along anterior margin.

Female: similar to male, except length including terminalia ca. 3.5 mm; ovipositor well-developed (see Fig. 27).

Type material.—Holotype male, labeled "WASHINGTON: Comet Falls/Tr., above van Trump Crk./Mt Rainier NP 4500 ft./W. J. Turner 13-VIII-1977/sweeping" (USNM). The specimen is in excellent condition and most of the diagnostic features of terminalia visible without maceration; the type locality is in Pierce County, Mount Rainier National Park, about 6 kilometers north of Longmire, Washington. Allotype, same label as holotype (USNM). Paratypes. Washington: 1 male (macrated terminalia in glycerin microvial attached to pin have become over-cleared), 4 females, same label as holotype (WSU).

Distribution.—This species is known only from the type series, collected in the central Cascade Mountains of Washington (Fig. 33).

Etymology.—The specific epithet is a combination of the Latin root "sub," for under, from, or somewhat, and "ensifera," alluding to the structural similarity between the new species and *C. ensifera*.

***Chelifera subnotata* MacDonald,**

NEW SPECIES

Figs. 4, 31

Diagnosis.—This species is a member of the *C. notata* group. Adults are most similar in appearance to adults of *C. notata*. Males, however, possess nearly concolorous brown terminalia in contrast to those of *C. notata*, in which the brown cercus contrasts with the yellow epandrial lobe and hypandrium. Additional differences in male terminalia include the shape of the cercus (much broader on males of *C. subnotata*) and the epandrial lobe (excavated apicodorsally on males of *C. subnotata*, exposing the cercus in lateral view). Females of *C. subnotata* and *C. notata* appear inseparable (see remarks under *C. notata*).

Description.—Male: Length including terminalia ca. 3.6 mm. General body color golden brown, with dark brown, median stripe on scutum. *Head*: black; mouthparts yellow; antenna yellowish white, stylus yellowish. *Thorax*: golden brown with broad, brown stripe medially on scutum; notopleural region yellow; scutellum and postnotum brown; pleura light grayish brown; humeral region brown, shiny. *Legs*: yellow, except distal 1–2 tarsomeres light brown; mid femur ventrally with row of black setulae along middle third (see Fig. 1); mid tibia ventrally with row of dark brown, pointed setae over distal half. *Wing*: hyaline; stigma (see Fig. 30) well-developed, elongated, light brown. *Abdomen*: reddish brown terga and sterna, except distal 2 terga yellowish brown. *Terminalia* (Fig. 4): brown; cercus slender basally, broadened distally; epandrial lobe narrowed apicodorsally, exposing distal half of cercus, black setulae lining apex; anterior hypandrial process long, smoothly curved posteriorly; posterior hypandrial process shorter, somewhat more abruptly curved posteriorly at apex.

Female: indistinguishable from females of *C. notata*.

Type material.—Holotype male, labeled: "NY Schuyler Co./Texas Hollow/20 Aug 1980 (handwritten over typed "July . . . 1978)/leg DJ Bickel" (CNC, holotype no. 21332). The holotype is teneral, with the body collapsed and the wings badly wrinkled; macerated terminalia are in glycerin microvial attached to pin. The type locality is in Schuyler County north of Elmira, New York. Paratypes, New York: 1 male (similar condition as holotype; macerated terminalia in glycerin microvial attached to pin), same label as holotype (CNC); 2 males (both specimens in poor condition, lacking a head, wings, and legs, but terminalia show most of the diagnostic features without maceration), Old Forge, Jul (CU).

Distribution.—This species is known only from two locations in New York state (Fig. 31).

Etymology.—The specific epithet is a combination of the Latin root "sub," Latin for under, from, or somewhat, and "notata," alluding to the structural similarity between this species and *C. notata*.

Remarks.—Males of *C. subnotata* resemble those of a Palearctic species, *C. subangusta* Collin ("type" male, BMNH, examined Dec. 1989), but they differ in coloration and in the structure of the terminalia. The main difference is in the pair of posterior processes that arise from the hypandrium. Although abruptly curved posteriorly toward the apex on males of both species, each posterior hypandrial process on males of *C. subangusta* (see Fig. 293 of Collin 1961) possesses two additional hooks that are lacking on males of *C. subnotata*.

Chelifera valida (Loew)

Figs. 16, 34

Hemerodromia valida Loew, 1862: 208.

Chelifera scrotifera Melander, 1947: 257.

(New synonymy)

Diagnosis.—Males are easily recognized by their large size, dark coloration and distinctive terminalia, especially the large cercus bearing a slender process that arises from a deep, dorsal cavity. Females are much larger than females of *C. stuprator* and typically possess complete venation; the distinction between females of *C. valida* and *C. recurvata* is made in the diagnosis of the latter species.

Description.—Male: length including terminalia 4.3–4.8 mm. General body color reddish black. *Head*: black; antenna scape and pedicel yellow, flagellum orange to brown, stylus brown. *Thorax*: reddish black, densely pruinose; scutum with 2 prominent lateral stripes; humeral area shiny black. Legs yellow brown, except distal tarsomere brown; mid leg lacking prominent vestiture. Wing hyaline, stigma lacking. *Abdomen*: reddish black. *Terminalia* (Fig. 16): concolorous with abdomen; cercus greatly enlarged, with long, clubbed process arising

from deep, dorsal cavity; anterior hypandrial process long, bent posteriorly ca. mid-way and curved posteriorly at apex; posterior hypandrial process thick basally, much shorter, nearly straight at apex. Female: similar to male except length including terminalia 4.5–5.0 mm; ovipositor weakly developed (see Fig. 28).

Type material examined.—*Hemerodromia valida* Loew, holotype: sex undetermined due to missing abdomen; top label "Type no. 1644," next label "H. B. T.," next label "Loew coll.," bottom label "valida m." (MCZ); Loew (1862; pg. 208) indicates the specimen was collected in "Hudsons Bay Territory." The specimen is in very poor condition. In addition to lacking an abdomen, it also is missing the right wing, most of both mid legs, and the hind tarsi; the head and thorax are covered with fungal strands. *Chelifera scrotifera* Melander, holotype male, labeled "Savonski/Naknek Lake/Alaska/June '19/Jas. S. Hope/Collector" (USNM). The specimen is in excellent condition, except for lacking the right wing, and the diagnostic features of terminalia visible without maceration.

Other specimens examined.—CANADA, Northwest Territories: 2 males, 9 females, Cary Lk., Jul; 8 males, 3 females, Granet Lk., Jul; 1 male, 5 females, Hyndman Lk., Jul; 21 males, 9 females, Lac Maunoir, Jul; 11 males, 9 females, Muskox Lk., Aug; 2 males, 18 females, Padley, Aug; 7 males, 8 females, Salmita Mines, Jul (CNC). UNITED STATES, Alaska: 3 males, 6 females, Savonoski, Naknet Lk., Jul (CAS); 1 male, 1 female, Wonder Lk., Jul (WSU).

Distribution.—This species is known from Alaska and the Northwest Territories of Canada (Fig. 34).

Remarks.—The situation pertaining to *C. valida* was perplexing, due largely to the lack of a described male, initial difficulty with Melander's 1947 key and descriptions, and absence of specimens of *C. precatorea* (Fallén) from North America. The latter species is Palearctic, but Melander (1947) suggested

that it might exist in North America and, if so, *C. valida* would be a synonym of *C. precatorea*. However, the apparent absence of *C. precatorea* in North America and continued examination of specimens of *C. scrotifera* eventually suggested the possible conspecificity of the latter and *C. valida*. Examination of the holotype of *C. valida*, although badly damaged, revealed that it closely resemble Melander's (1947) concept of *C. scrotifera*. The points of agreement between the holotype of *C. valida* and the holotype of *C. scrotifera* (and all other examined specimens) include a brown flagellum, a pair of prominent lateral stripes on the scutum, a shiny black humeral depression, and lack of a wing stigma. Based on the lack of a wing stigma on the holotype of *C. valida* and the presence of a stigma on *C. precatorea*, together with sympatry of *C. valida* and *C. scrotifera* and the apparent absence of *C. precatorea* in North America, *C. scrotifera* is considered a junior synonym of *C. valida*.

Chelifera varix Melander

Figs. 7, 10, 32

Chelifera varix Melander, 1947: 258.

Diagnosis.—This species is the nominal species of the *C. varix* group. Males are characterized by a pigmented patch on the inner surface of the fore tibia and a strongly concave median margin of the cercus. Wing venation of females of *C. varix* differs from that of females of *C. chvalai* (see diagnosis under the latter). Entirely yellow abdominal terga distinguish females of *C. varix* from those of *C. mana*, in which the abdominal terga are pigmented medially.

Description.—Male: length including terminalia ca. 3.2 mm. General body color yellow. *Head*: black; antenna yellow. *Thorax*: yellow with orange tinge, shiny; sparsely pruinose. Legs yellow, except slightly darkened distal tarsomere and darkly pigmented, crescent-shaped patterns on inner surface of fore femur; fore femur (Fig. 7) greatly

swollen, diam. ca. $3 \times$ that of fore tibia, with apical process bearing dense fringe of golden setae; fore tibia with darkly pigmented area midway on inner surface; mid femur with basal swelling bearing 3 yellow bristles; mid tibia ventrally with 2 rows of dark setae over distal half. Wing hyaline, stigma lacking; M_1 ca. $1.5 \times$ longer than stem M_{1+2} . *Abdomen*: yellow. Terminalia (Fig. 10); yellow; cercus with concave median margin bearing black setulae; anterior hypandrial process elongate, curving posterodorsally; posterior hypandrial process much shorter, pointed at apex. Female: similar to male except length including terminalia ca. 3.5 mm. and legs lacking distinctive structure and vestiture; ovipositor well-developed (see Fig. 27).

Type material examined.—Holotype male, labeled "St. Regis Pass/ 27 July '16, Mont/ A. L. Melander" (USNM). The specimen is in excellent condition and most of the diagnostic features of terminalia visible without maceration. The type locality could not be determined, but may be in Mineral County, near St. Regis, Montana.

Other specimens examined.—CANADA. British Columbia: 1 female, Mt. Revelstoke Nat. Pk., Aug (CNC). UNITED STATES. Washington: 14 males, 13 females, Spokane St. Prk., Jul (WSU). Wyoming: 1 male, 1 female, Yellowstone Nat. Prk., Dunraven Pass, Jul (USNM).

Distribution.—This species is known from Yellowstone National Park in Wyoming and northwest into southeastern British Columbia. (Fig. 32).

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